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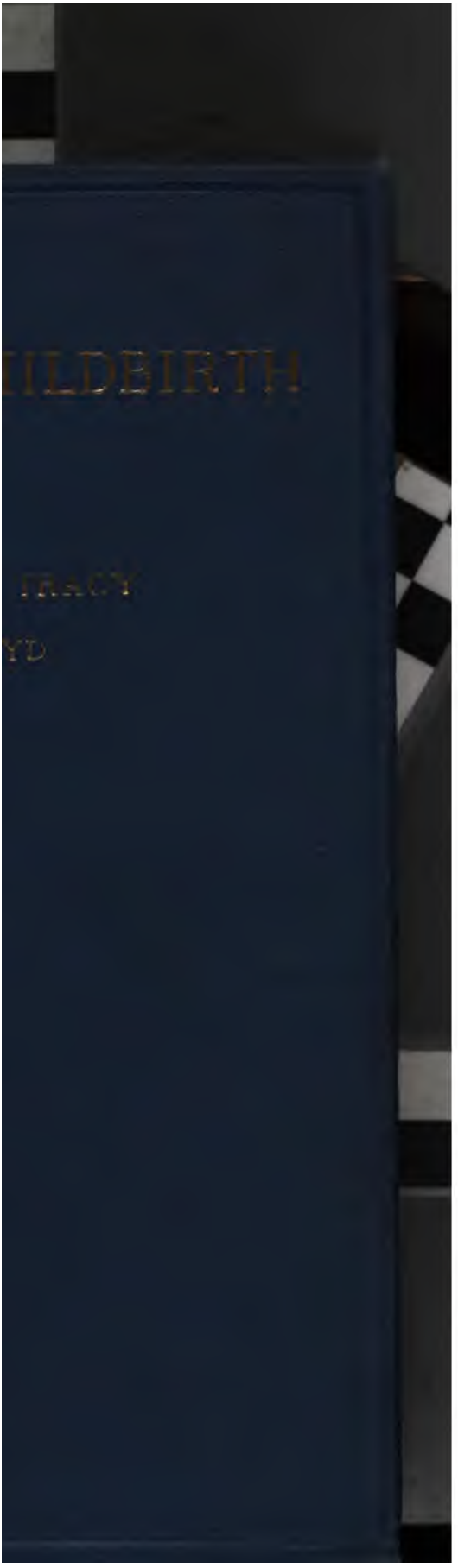
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PAINLESS CHILDBIRTH

A GENERAL SURVEY OF ALL PAINLESS METHODS
WITH SPECIAL STRESS ON "TWILIGHT SLEEP"
AND ITS EXTENSION TO AMERICA

BY
MARGUERITE TRACY
AND
MARY BOYD

WITH NINETEEN ILLUSTRATIONS FROM PHOTOGRAPHS

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TO M-L.P——

WHOSE PRACTICAL WORK IN DÄMMERSCHLAF IS ENSHRINED IN THE LOVING TESTIMONY OF THOUSANDS OF MOTHERS, AND WHO, BUT FOR THE ANONYMITY OF HER SERVICE WOULD BE KNOWN TO-DAY AS ONE OF THE FOREMOST OBSTETRICAL ANÆSTHETISTS.

40490

If a woman becomes weary and at last dead from bearing, that matters not; let her only die from bearing. She is there to do it.

MARTIN LUTHER

PAGE
Familiarity with pain brutalises the doctor 27
The pain of birth equal to the pain of surgery 27
Evidence in regard to the acuteness of birthpain 28
The physiological function of birthpain 28
Destruction of vitality by pain 29
Removal of pain saves vitality for resisting the emergencies of birth 29
Birchmore on birth relieved of the impediment of pain . . 30
His painless cases show muscular contractions normalised by removal of pain and dilatation furthered 30
They show less laceration 30
Pain lengthens labour 31
Pain often makes forceps and other operations necessary . . 31
Injury to the child through mother's pain 31
Operative frequency under painlessness cut in half . . . 31
Krönig on convalescence from painless birth 32
Gauss on painless birth 32

CHAPTER III

FEAR AND PAIN: THE PSYCHOLOGY OF MATERNITY

Actual fear of childbirth, as opposed to hysterical apprehensions disregarded by the obstetricians 33
Birchmore on fear 33
Krönig on fear 33
Fear part of traumatic shock of childbirth 34
Butler on the place of fear throughout childbearing period . 34
This fear dominates some women's lives 34
A few sensitive obstetricians take account of the farreaching consequences of both fear and pain in childbirth . . 37
Effect of pain on the nervous system 38
Puerperal psychosis 38
Relation of fear to this and to psychosis in pregnancy . . 38
The young girl's fear of marriage 39
The desire for a child fights with fear of childbirth . . 39
Deceptive natural amnesia 39
The fear that follows one painful birth 39

PAGE

Hysteria derived from the Greek word for womb . . . 40
Nerves broken down by painful birth sometimes simulate uterine disease 40
Gauss's testimony to this 40
Possible effect of birthpain on women's mental development . 41
Women have faced painful childbirth bravely as long as it was unavoidable 42
From Genesis on, childbirth has been the literary exemplum of pain 42
Birth rate contrasted with death rate; sum of suffering through birth and the ills following greater than through disease and death 42
Dämmerschlaf does away both with painful birth and with much uterine disease 42
Harper's Weekly speaks of desirability of perpetuating birthpain 43
Stoical women desire birthpain 43
These put courage above the conserved vitality which they could expend on their children after a painless birth . . 43
Peace of mind part of prenatal care for mother and child . . 44
Burdens of pregnancy are enough 44
Birth should be a rite to maternity, not an animal agony . . 44

CHAPTER IV

GAUSS AND DÄMMERSCHLAF: 80% PERFECT

"Gauss 1906": personality and work of the author . . . 46
Scope and method of his 1906 report 47
The state of Dämmerschlaf defined 47
The ideal state for the birth process 48
Atropin-hyoscin-scopolamin family 48
Earlier use of scopolamin in obstetrics 48
Gauss's infinite pains in working out the technique of Dämmerschlaf 49
Perfect Dämmerschlaf 49
First experimental mothers were dogs 49

PAGE

"Gauss 1906" (Births in Artificial Dämmerschlaf); study of first 500 human mothers 50
This report stands alone, for scope and the care with which details are studied, in obstetrical literature 50
Later reports on 1,000 cases (1907); on 3,000 (1911); on 600 (1913) and on 511 (1914) 50
Work at Freiburg not an experiment but a proved experience 50
"Touchstone" for all obstetrical use of scopolamin-morphin . 51
Relation of Gauss's 1906 to later reports 51
Three stages of Dämmerschlaf: painlessening, partial, and deep Dämmerschlaf 51
Introduction of Dämmerschlaf described by Gauss . . . 51
Semi-narcosis and artificial Dämmerschlaf compared . . . 53
Forgetfulness characteristic of this condition of clouded consciousness 54
Examples 55
Amnesia 56
Derangement of apperception the sign of amnesia; "memory test" the means of maintaining Dämmerschlaf . . . 57
Pupillary reaction and locomotor ataxia also signs of Dämmerschlaf 57
Difficulties in guiding Dämmerschlaf 58
Disturbances of the senses 58
Antiphones and mask 59
Muscular sensation 59
Touch and perception of pain 60
Method stands or falls by the memory test 60
Amount and regulation of dose of scopolamin and morphin . 60
Percentage of success in free wards smaller because of disturbances of the senses 61
Percentage of complete and partial success in Gauss's first 500 cases 61
Percentage in his later studies 61
Percentage in first ward 61
Gauss laid down conditions for his work, for safety of mother and child 62
His early experience led him after the experimental stage was passed to offer Dämmerschlaf to all mothers in active labour 62
His statement on this matter in America 62

PAGE

Gauss on painlessness as an aid to birth; preventing secondary insufficiency during birth and nervous-uterine diseases after 63
Easy convalescence 65
Detailed studies by Gauss's assistants show duration of birth and muscular contractions normal 65
They show blood loss normal 66
They show mother and child uninjured 66
Use of forceps under Dämmerschlaf 66
Use of other operations under Dämmerschlaf 66
Standardising of scopolamin by Professor Straub 67
Gauss on the condition of the child 67
Statistics of the first 500 children 68
Oligopnœa or light breathing 68
A visiting doctor's description of oligopnœa 69
Asphyxia never caused by Dämmerschlaf 70
Morphin should be cut down to minimum for safety of child . 70
Gauss cuts percentage of oligopnœa in half in 1907 . . . 70
Infant death rate cut in half by Dämmerschlaf at Frauenklinik 70
Prof. Aschoff's explanation 71
Effect of breathing impediments on later development . . 71
Holzbach shows that minute quantities of scopolamin are soon thrown off by the child 72
Mortality of Frauenklinik babies in first year of life less than ordinary mortality in that year in Baden 72
Larger percentage of mothers confined in Dämmerschlaf nurse their children 72
Favourable statistics on a group of over 400 Frauenklinik babies followed through first year of life 73
Freiburg Frauenklinik has the lowest mother and infant mortality of any maternity hospital in Europe 73
General summary of Gauss's 1906 report 73
Drs. Harrar and McPherson on disregard of Freiburg technique by other obstetricians 73
Gauss on the advantages of Dämmerschlaf 74
What the Freiburg record has proved 74
An 80% perfect method with small percentage of failure and requiring in all cases special environment for success . 74
The future may develop a 100% perfect method 75

PAGE

... was in 1847 . 76

... discoverer of surgical

. 76

... was for obstetrical an-

. 76

. 76

... anæsthesia with ether

. 76

... opponents . . 77

. 78

. 78

... spontaneous births up to

. 79

. 79

. 79

. 79

. 80

... most of his successors . 80

... in obstetrics is mere un-

... condemnation 80

... childbirth 81

... mother herself to administer

. 81

. 81

... safe in childbirth . . 82

... can administer them success-

... labour 82

... producing practical Dämmer-

. 83

... condition 83

... methods commonly used to-day 84

... anæsthesia is condition aimed at by

..., disturbance of attention in

... not intentional . . . 84

PAGE

Hypalgesia or mere painlessening aimed at by most obstetrical anæsthetists 84
J. P. Reynolds' experience 84
A mother's evidence in regard to unsatisfactoriness of this condition 85
No effort has been made to study and standardise the possibilities of obstetrical anæsthesia with ether and chloroform 85
Simpson considered it the moral duty of every obstetrician to furnish painlessness in childbirth 86
The Royal Medical and Chirurgical Society recognised obstetrical anæsthesia in 1860 as safe and desirable . . . 86
Yet A. Ernest Sanson speaks of the opposition offered by his profession to obstetrical anæsthesia 86
Struggle for more common use by prominent obstetricians . . 86
Reynolds and Allwright say choice should be left to mother not to doctor 86
A German student of obstetrical anæsthesia finds chloroform, ether and scopolamin-morphin the only anæsthetics suitable for long births 88
He declares that they are not used, simply because they are too much trouble 88
He brings out the unstandardised character of the experience with chloroform and ether 88
Little attention given to obstetrical anæsthesia in the literature of obstetrics 89
Simpson's work taken little advantage of by his profession . 89
His prophecy that women would in time themselves rebel against the usual tortures of childbirth is now coming true 89
It promises to make effective the work Simpson began . . 90

CHAPTER VI

"TIME WILL TELL": BERLIN TO CHICAGO

Gauss in 1911 on opponents and supporters of Dämmerschlaf . 91
Gauss on scope of Freiburg experience in that year . . . 91
Germany loses interest in the subject, as England had lost interest in Simpson's work 91

PAGE

Publicity given Twilight Sleep in popular magazines considered a reflection on the progressiveness of American medicine . 110
Fear of safety and practicability of the method made American doctors unfavourable till they had themselves experimented 111
Attitude of two medical journals 111
Much of the criticism of Twilight Sleep in summer of 1914 is in reality criticism of early unstandardised use of scopolamin in obstetrics 112
Journal of American Academy of Medicine criticises . . . 112
Barton C. Hirst criticises on same basis, but with effort to make it seem that Freiburg method is the same . . 113
E. Gustav Zinke's criticism 113
Charles M. Green criticises on basis of his own failures before Twilight Sleep existed 114
Only a few American obstetricians would acknowledge at first that Freiburg method differed from their own . . . 114
Dr. Ross McPherson's acknowledgment of this 115
Changed character of the criticisms in the late fall, after experimentation 116
Franklin Newell of Harvard counsels, like Gauss, extreme care and high skill in the use of scopolamin-morphin . . . 117
Women to some extent protected from danger of ill-informed general practitioner using scopolamin incautiously, by their own knowledge of the Freiburg requirements . . . 117
They are becoming hospitable to the idea of hospital confinement 117
Doctors themselves draw on popular magazine descriptions of the technique 117
Effect of the women's demand on the general practitioner . . 118
Exodus of American doctors to Freiburg in summer of 1914 . 118
Freiburg Frauenklinik accused of commercialism . . . 119
Freiburg Frauenklinik emptied of its staff by the war . . 119
Twilight Sleep handed over to America 120
American reports on Twilight Sleep begin in the fall . . 120
Milwaukee Medical Society and the women of Milwaukee . 120
Sessions on Twilight Sleep by all medical societies throughout the country 120
All the root and branch opposition was by those who stated they had not themselves used the method 120

PAGE
A dozen meetings on the subject in New York City . . . 121
Memorandum of Public Health Division of American Academy of Medicine urges investigation and makes the important statement, for the first time in medical history, that the pains of maternity should be relieved 121
Women's Division of American Academy of Medicine as to the perfect practicability of Twilight Sleep 122
Personal views of doctors reporting at meetings . . . 122
Opinion of Dr. Craigin 123
Opinion of Dr. J. Thompson Schell 123
Some report having used scopolamin for many years . . . 123
Some report having failed before, but succeeded now that they are using Freiburg method 123
Testimony of Dr. Bertha Von Hoosen 124
Testimony of Dr. Franklin S. Newell 124

CHAPTER VIII

TIME HAS TOLD: AMERICAN REPORTS ON AUTHENTIC TWILIGHT SLEEP

In September, 1911, the two earliest reports on series of cases in Twilight Sleep read before American Association of Obstetricians and Gynæcologists 125
Many verbal reports on series of cases in various cities . . 125
Siegel's method 126
Gauss's estimate of this method 126
The method contrasted with that of Gauss; fixed versus individualised dosage 126
J. de Lee on Siegel's method 127
Krönig on Siegel's method 128
A case which shows the difference between the two methods . 128
Siegel's method a menace to authentic Twilight Sleep . . 128
Probably as many as 3,000 cases of authentic Twilight Sleep now exist in America 129
Reports published by four hospitals 129
None of the experimenters Freiburg trained but have followed published rules rigidly 129
Dr. Schlossinck 129

PAGE
No after-pains 158
Readjustment of organs aided 158
Value of artificial painlessness where minor operations are suddenly called for 159
Value in eclampsia 159
Antalgésine, the new French obstetrical narcotic . . . 159
Still an experiment, not like Twilight Sleep, a proved experience 159
Ribemont-Dessaignes reports on 112 cases under Antalgésine . 160
"A drug for the provinces" 160
Pouchet's chemical analysis; detoxicated morphin . . . 160
Its quick action and other advantages 160
The state of consciousness 161
The chemist Georges Paulin discovers Antalgésine . . . 162
Ribemont-Dessaignes, "accoucheur des hôpitaux," reports on its use and astonishes French obstetricians . . . 162
Georges Paulin's story 165
"Tocanalgine"—Painless Birth 166
Paulin's hospital 167
Ribemont-Dessaignes' story 169
Le Laurier's report 171
Pinard's evidence 172
French obstetricians on oligopnœa 172
An American obstetrician's experiment with Antalgésine . . 173
He compares its effect with Twilight Sleep 173
Strength and weakness of Antalgésine 174
Educational value of Twilight Sleep 175

CONCLUSION

THE OBSTETRICS OF TO-MORROW

Wise judgment and gentle skill characteristic of this age of obstetrics 176
The general practitioner does not possess this judgment and skill 176
Many lives lost through inability of doctor to perform cæsarean section 177
In surgery barber is replaced by skilled specialist . . . 177

PAGE

General practitioner, obstetrician and gynæcologist now share care of women's sex life 177
Gynæcologist repairs injuries done in childbirth by general practitioner 177
Obstetrician not properly respected 178
Obstetrician and gynæcologist should be one 178
T. Whitridge Williams' evidence 178
Obstetrical anæsthesia needs the hospital and the specialist . 178
Life-giving should be put on same high basis as life-saving in surgery 179
To-day life-giving causes a greater volume of suffering than disease 179
Hospital necessary to development of obstetrics 179
Morbidity and mortality at childbirth is lowered only in the hospital 179
100% perfect obstetrical anæsthesia is that which requires the hospital and expert care 179
Need of hospitals for childbirth 179
Expense of Twilight Sleep should be apportioned to patient's capacity to pay, supplemented by hospital endowment, as it is to-day in surgery 180
Progress of obstetrics bound up in painless methods . . . 180
Cheapness of life to-day 181
Cheapness and over-population go together 181
Twilight Sleep entrusted to the women of America to promote 181
A chain of Twilight Sleep hospitals or hospital wards the possible development of the future 182
Painless spontaneous birth should be as universal as painless surgery 182

SUPPLEMENTARY CHAPTER

HOW IT FEELS TO TAKE THE TWILIGHT SLEEP

The Freiburg experiences of: Mrs. Cecil Stewart, Mrs. Mark Boyd, Mrs. Francis Carmody 185

APPENDIX I

Painless Delivery in Dämmerschlaf. By Bernhard Krönig, 1908 205

FACING PAGE

(a) "Volcker," of Freiburg, son of a University professor who has made a special study of the 50 per cent. decrease in infant mortality at the Klinik since the introduction of Dämmerschlaf. (b) "Peter" Straub's father discovered a means of preserving scopolamin in solution: Peter was born under its Dämmerschlaf five years ago 63

Sir James Young Simpson's sole and persistent work was with obstetrical semi-anæsthesia, or the attaining of painless spontaneous birth. "My profession may never help me," he said once, "but women themselves will betimes rebel against the usual tortures and miseries of childbirth." 94

The first "painless" child. By chloroform *à la reine* Sir James Young Simpson maintained a Dämmerschlaf condition from six to fourteen hours 95

Gouverneur Hospital in New York, where Mrs. Hans Leuderman's baby was born in January, 1914, has reported success in over 100 cases of Twilight Sleep, and is the only American clinic which employs the "active convalescence" of Freiburg 142

(a) Barbara Jane, born under Twilight Sleep at the Wesley Hospital, Chicago, September, 1914. (b) Mrs. Francis Xavier Carmody and her little boy, Charlemagne, born July, 1914, while the visiting American doctors were at Freiburg, converted at least one famous American obstetrician to Dämmerschlaf . . 143

Professor Weismann's great-grandchild, born under Dämmerschlaf in 1913. Professor Weismann was the contemporary of Darwin. He was emeritus professor of biology at the University of Baden, and died at Freiburg in 1914 174

FACING PAGE

Mrs. Joseph A. Sargent and William Winthrop Horne Sargent, one of the youngest of the American boys born at Freiburg. His family came up from Spain that he might be a Dämmerschlaf baby . . . 175

"The second day after the baby was born I got up——" From a snapshot taken by Marguerite Tracy in the Frauenklinik, showing Mrs. Stewart out of bed on the second day 190

"Sumner," the little son of Mrs. Mark Boyd, born at Freiburg in January, 1914. Mrs. Boyd turned an interruption in the course of work into an opportunity for intensive work of a special kind 191

to be a perfect method when it is practised in its due environment, and when its peculiar requirements are scrupulously observed.

It is with this second or Dämmerschlaf method that we have at present to do. It is for this Twilight Sleep that the women of America are agitating. Aroused to the fact that such a method exists, they have fulfilled the prophecy made by Simpson two generations ago, when he said: "Women themselves will betimes rebel against enduring the usual tortures and miseries of childbirth."

They are demanding that medical science shall create the environment, and fulfil the exacting requirements for Dämmerschlaf, or "Twilight Sleep."

From France, at this moment, come the first reports on what may prove to be a third period. Obstetricians of such world authority as Pinard and Ribemont-Dessaignes are experimenting with it, claiming for it that it requires no special environment or care. Although in its purely experimental stage, this method is reported here to present the views of French obstetricians of the first rank toward painless childbirth; Ribemont-Dessaignes being indeed the first scientist advocate of painless childbirth to base his whole case on the actual superior safety of the removal of pain, quite aside from humanitarian grounds. Ribemont-Dessaignes's method may be said to represent an effort in obstetrics to work out something so simple that it needed no special conditions of environment or watching for success.

Hitherto painlessness has been provided in childbirth when the doctor thought the case required it. Stimulated by the Dämmerschlaf, and the Freiburg ideal that

all births should be made painless, the women of America are demanding that the administration of painlessness shall not be left to the decision of the doctor, but of the mother. The effectiveness of their demand is illustrated by a recent statement at a meeting of obstetricians, where, unchallenged, one of their number said: "The Dämmerschlaf can be administered safely and successfully, but with infinite pains to doctor and nurse. The decision as to whether it shall be used rests not with the doctors but with the women themselves."

For two generations individual medical enthusiasts for obstetrical anæsthesia have from time to time demanded that the pains of childbirth be relieved.

Now for the first time in the history of medicine a public health body has issued a memorandum to its members on this same theme: the pains of maternity should be relieved. This, coming from the Committee on Public Health of the Academy of Medicine, should be a justification of our lay agitation of the subject, if, in the minds of serious women, any justification is needed.

For while to-day in all obstetrical meetings—local, state, and national—throughout America, the burning subject is Twilight Sleep, we recall that in a European review a year ago Rosika Schwimmer recorded that at an International Congress of Obstetricians then sitting, *every aspect of childbirth was discussed except that of the possibility of relieving pain.*

Obliged to collect our material without help from practising doctors, we have perhaps been led to study their works more intensively than have the students in their classes. And while there is certainly a whimsical novelty

in the position of authors scrupulously repudiating rumours that courtesy was extended them by their authoritative sources of personal information, we wish to state definitely that Professors Krönig and Gauss of Freiburg were in no way helpful to us in our researches, but on the contrary were baffling and obstructive to the last degree. Indeed, our experience at Freiburg was so difficult and disheartening that when it came to getting the facts about the French experience, under pressure of limited time, one of us allowed herself to be mistaken for a student of obstetrics from an American hospital. This should exonerate Professor Ribemont-Dessaignes, if, like the Freiburg doctors, he is professionally attacked.

We warmly acknowledge our debt of personal gratitude to the women of Freiburg, before whom Professor Krönig himself was obliged, some years ago, to state the case for Dämmerschlaf when its medical opponents had all but discredited it by misrepresentation. The hearty and enthusiastic co-operation of these Freiburg mothers, who placed at our service all their experience and that of their friends, gave us almost limitless personal sources of information by means of which we were able to animate and popularise the dry records in the German archives of gynecology and obstetrics.

Of the little group of American mothers who determined to put their personal experience of the Freiburg method before the women of America, Mrs. C. Temple Emmet was the first to test the method and to endorse it by returning twice to Freiburg for the Dämmerschlaf. Her friends scarcely grasped the fact that an absolutely painless birth was possible for them also. Women had

never before heard of, and could not wholly believe in, total immunity from pain throughout a birth.

Until, commissioned by *McClure's Magazine,* we began to study the subject, we thought that the Freiburg effort was unique, so utterly had Simpson's contribution to painless childbirth been allowed to die because it had been entrusted to his profession.

And while there is a novelty, not whimsical, in a body of women being obliged to place before the lay public of the world a gift of science which has by rights been its possession for two generations, we nevertheless do place this account of the long and uphill effort for painless childbirth in their hands.

It is, as far as we know, the first time in the history of medical science that the whole body of patients have risen to dictate to the doctors.

New York City, January, 1915.

PAINLESS CHILDBIRTH

CHAPTER I

The Frauenklinik: A Day in June

In the midst of the great controversy then at its height in European obstetrics, the prime cause of that controversy, Professor Bernhard Krönig, received an unusual patient.

The month was June. The year 1908. The cool shade trees of a German garden protected the tables and chairs and benches where little groups of convalescent mothers talked over their recent experiences, speculating among themselves in regard to a new phenomenon.

The sunlight lay in dazzling patches on beds of bright flowers, on the snowy white curtains at the open windows of the wards of the Woman's Hospital—the Frauenklinik of the State University of Freiburg, in Baden. It rested like a spotlight on a hurrying group of doctors encased in long white linen coats that flew starched tails like pennants, their chief striding ahead of them in vehement discourse which they were expected to catch on the wing.

It did not escape the attention of the convalescent mothers that the chief was not in his sunniest mood, in spite of the June day and the sympathetic anxiety to please noticeable in the faces of the breathless staff. Their dizzyingly white procession whipped sharply into the great

doorway of the dilapidated grey wing which contained the lecture rooms, operating theatre, and private wards, and then disappeared.

The convalescent mothers, mostly patients of the third and fourth class wards, resumed their speculation on a phenomenon revolutionary to the laws of nature and orthodoxy, in which they had been involved.

The topic under discussion was that of having one's baby, under any or all complications, without pain. And these were the old guard of the free wards, the "multiparæ," who had had babies in the Frauenklinik even before the old chief died and the new chief had been summoned to replace him. The new chief had brought new ideas, which he was developing with their co-operation, to the great comfort of their persons. But the topic was none the less still under discussion, and each new convalescent added her contribution to it.

In the little world of European obstetrics the topic was equally under discussion.

The Frauenklinik was the centre of a great controversy comparable only to that which had raged round the work of Sir James Young Simpson in England in 1848. The obstetricians of Berlin were determined that the Freiburg experiment in painless childbirth should fail. The first university of Germany could not afford to let the third university of Germany get the credit for a new and revolutionary contribution to obstetrics, and impose on the profession a method involving infinite work and trouble for the obstetrician.

Professor Bernhard Krönig, the new head of the department of gynecology and obstetrics at the Freiburg Univer-

sity, was the comparatively young man who had had the daring to challenge Berlin with the result of his experiences in painless childbirth. The exhaustive report prepared by his assistant, Dr. Carl Gauss, in 1906, was reaping a whirlwind of professional anathema, because it was so scientifically convincing that it defied legitimate attack. Krönig had followed up this cold scientific report by an unforgettable appeal to his colleagues to give due importance to the relief of pain. He had already disturbed the smooth course of obstetrical debates by opposing to the first principle of modern obstetrics, which enjoined saving the mother, if need be, at the expense of the child, his notable amendment that the obstetrician should make himself competent to save the mother *and* the child. His, "I will save the mother *and* the child," had rung through the medical schools, causing a preliminary consternation. Upon the heels of it, the reports from his Freiburg clinic and his addresses to the various obstetrical congresses showed him a young advocate for humanity with a soul on fire. Upon this youth Berlin felt under the necessity of using its bitterest rod of dicipline; upon this fire it poured ridicule and contempt.

"Time will tell," was the sententiqus declaration of the great Bumm through his mouthpiece, Hocheisen. Hocheisen meant that the Freiburg experiment would be killed by adverse opinion, since it was settled that it should not have the seal of approval of Berlin.

Time did tell, though not in the way implied by young Hocheisen and the obstetricians of Berlin.

But on that clear June day, in the half-mediæval city of the Black Forest which is Freiburg, time had as yet

brought nothing better than a malicious campaign of personal innuendo against the innovator of Freiburg's "Dämmerschlaf," which was the name given to the new method for abolishing suffering in childbirth.

Outraged in his personal honour by sneers against what was termed his "propaganda"—for he had consented to talk to the women of Freiburg themselves about what was being done at the clinic where a number of them had been private patients—the chief of the Frauenklinik was in no easy mood either for his sedulous staff or for the potential patients who were gathering outside his grey little consulting room as the afternoon consultation hour approached.

The first of these tentative inquirers was a timid young German woman. She afterward reported her interview as something like this:

"I-am-expecting-my-baby-this-month, Herr Professor—and-my-last-baby-thirty-three-hours-of-such-colossal-suffering-was-that-I-thought-I-would-come-and-you-would-to-have the-Dämmerschlaf-advise-me-so-I-too-can-a-painless-child-geborn."

If it hurt the professor to extinguish this flicker of hope in a frightened heart, he gave no sign of it, but said: "I am very sorry. I cannot advise you."

During the five minutes which her courage lasted, his formula never varied. He was very sorry, but he could not advise her, he could advise nobody, to take the Dämmerschlaf. He walked continually the length of the gloomy little bare-walled cage with the grated windows that was his office, and she presently found herself shoved with a firm but friendly hand into the arms of the at-

tendant head nurse. He was not conducting a propaganda, and it was a matter of no concern to him one way or the other who took the Dämmerschlaf. He was in his consulting room to examine patients, not to make up their minds for them.

The next was the unusual patient.

The professor's face cleared with relief at sight of her. She was one of those people, like himself, who know their own minds and have eager convictions. She had come to him a month before, declaring her intention of having the Dämmerschlaf, had selected her room, her nurse, etc., and then had gone away to return in June.

She was the first American patient to apply at the Frauenklinik for Twilight Sleep.

Years were to pass before one of her women friends was actually to cross the ocean to follow her example.

Her first "painless child" was born that June day at the clinic, in the shabby old maternity wing of the hospital.

Two years later she was again at the clinic, for another painless child.

She found great changes.

She found a beautiful building added on to the old wing; an augmented staff, a number of birth-rooms especially designed for the delicate requirements of Dämmerschlaf, sunny private wards for the convalescents, and a nursery.

The Grand Duchy of Baden had recognised the importance of the Dämmerschlaf work; had seen the need of a specially fitted hospital, and, since Dämmerschlaf could be properly administered only in a hospital, the need of

fitting up such a hospital as could be comfortably resorted to by the sensitive women of the nobility. So there was a new hospital adjoining the old.

A year later the American patient returned for her third painless child. The consistency of her enthusiasm over these three events began to have its effect in America. Freiburg was now "on the map" among her friends, as the place where one went to a German hospital and had one's baby without pain.

She was now called upon to explain the painless method.

"You are put to sleep," she explained, "the moment that real pains begin. The last thing you remember is the second hypodermic injection. When you wake up, the nurse brings you your baby, all dressed, snuggled in his pillow."

Asked about the nature of the drug used to induce the peculiar sleep which obliterates memory but leaves the muscular functions unimpaired, her information was less specific.

It was only lately rediscovered, apparently, the drug which produced this result. Its name was scopolamin. It was used in very minute doses over the whole period of birth at intervals determined by the patient's condition of consciousness. With the initial injection there was combined a very small and harmless dose of morphin whose effect lasted over a period of some hours. The scopolamin had shown the characteristic of offsetting the undesirable features of morphin while it accentuated its influence on the thinking brain. The influence of scopolamin passed off quickly, and was without unpleasant after-effects.

Asked about the after-effect of the drug on the child, she declared that it had absolutely no after-effects on the child, and instanced her own healthy babies. And she described the marvellous rapid convalescence of the mother which is a feature of the painless confinement. More mothers, she added, were able to nurse their babies.

The history of the birth of this first American patient's first Freiburg baby brings out a number of points that illustrate the stage of development which the Freiburg method had reached in 1908, when its humane and scientific value was already well proved by the two doctors who had worked it out over a period of three years and about fifteen hundred cases, in the old maternity wards, without the advantage of suitable environment.

Even in the private wards, at that time, it was not 99 per cent. perfect, as it is to-day at Freiburg. Perfect Dämmerschlaf was not then an assured thing for every patient. The furnishing of the perfect environment and the adaptation of the dosage to the individual patient were still to come. Still to come, also, was the perfected stable solution of the drug. Professor Straub, of the pharmacological department of the University, was working on a preservative which has since taken its place in the pharmacopœia: *Scopolamin haltbar* is the name of the Straub preparation.

The first Twilight baby born to an American woman was nevertheless a miracle to its mother, who judged of her subjective experience by comparison with earlier births; it was not a miracle to the doctors, who had had completer successes with other cases.

It was a very quick birth, in which very slight pains

iting physicians have been unable, owing to the prejudice of the average private patient, to observe the Dämmerschlaf in its ideal environment in the first class ward.

But a sort of composite snapshot may be made up from the too technical reports of a long process, and from the notes that both as patient and as outside observer we have gathered during the many months spent at Freiburg. The patient usually has recollection only of going to sleep and of the curious subjective experience of waking up in a still dreaming state; but she hears, during her convalescence, many a quaint anecdote of her sleep, if she has been talkative, from her nurse and doctor, and some of these we may string together here, confident that any one who has assisted at an ordinary birth over a long period of hours will be able fully to appreciate what a very different thing a birth under Dämmerschlaf really is, not only for the patient but for the watching doctor.

The patient may have had her husband or other family representative with her in the darkened birth-room. But with the entrance of the nurse bringing the little white bottle of sleep, all disturbing elements must be withdrawn; and what element more disturbing than a close personal tie with the world of personal consciousness can there be? In the quiet stir of the nurse's entrance, therefore, the family unobtrusively goes out, usually unnoticed by the patient, who is now experiencing the first of her real pains and is either expressing them if she is emotional, or repressing their expression if she is stoical, and is being reassured in either case and soothed by the nurse. The doctor who is to direct the sleep has come in, examined the position and heart-beat of the child, and has withdrawn,

to return after the second injection shall have been given, and has begun to take effect.

The suffering of labor increases, combating the drowsiness of the patient, who is still conscious of the pains, and may ask for the next injection, and also for a drink of water, as the drug quickly makes her thirsty.

With the second injection the sleep deepens. She makes no response to remarks or questions, and her regular breathing speaks for itself. The necessary disagreeable preparations for the birth may be made without disturbing her, and some women express great thankfulness for this escape from these sights and sensations.

Later, the doctor comes in, feels her pains. She appears to perceive his touch, and herself comments on the pain as if in full consciousness; but while his hand is still on the relaxing muscle her expression has changed to one of childish interest, and she says: "It's all right now. The dog that was here just took it out of the room."

The incompatibility of ideas here expressed shows a perfect condition of amnesia or instantaneous forgetfulness, and there is as yet no need of another injection.

Direct questioning to evoke such an expression sometimes arouses impatience if not alert consciousness, and is likely to fail utterly with stupid patients or highly nervous ones; it has therefore to be used with great tact. But whether directly or indirectly applied, this test is the most important of all the means of checking up the condition of amnesia.

The labour progresses. The patient may not be making her voluntary share of it, however. Before suggesting this to her, the doctor may wish to make sure that her

She rises, perhaps, almost out of bed with the tremendous muscular lift of the expulsory effort, and then sinks back with a great sigh. Sometimes she expresses great interest in the baby; asks if it is a boy or a girl, etc.; but of this she retains afterwards no memory, any more than of her participation in the birth or the after-birth. Sometimes she has even offered to get up so that the nurses can more easily make her bed over. But, the birth done with, she relaxes into a profound and refreshing sleep from which she wakes, several hours later, to a great amazement, "incredulous that it is her own living child that is put in her arms."

Some time during that first day after, or during that first day, she is given some simple bed exercises, which she is surprised to find are painless; and these exercises are repeated every day during the lying-in.

Of the lying-in itself, there is no great objective evidence.

The patient who became a mother in the small hours of the night wakes refreshed. She may wake while she is still in the birth-room, on the somewhat unyielding bed on which she was confined, or she may have been transferred while still asleep to the ward or the private room. If to the ward, she will wake to find her baby in the crib at the foot of her bed. But whether the private patient wake in the birth-room or in her own room, the first thing she sees is the muslin-curtained crib, and her baby lifted from it and put into her arms.

Coffee and rolls are brought in for breakfast if that has been her morning custom. She sits up and breakfasts. At ten o'clock comes a light refreshment, such as milk or

JANE ERIN EMMET was the little girl born on a "day in June," when the great Berlin-Freiburg controversy over painless childbirth was at its height. Jane's brothers, WINTHROP and WILLIAM, both of whom were born under Dämmerschlaf, attest to the endorsement of the patients who have had the benefit of Dämmerschlaf at the Freiburg Klinik

Courtesy Miss Alice Boughton

MRS. CECIL STEWART was the second American woman to go to Freiburg for her baby.

beer and crackers. At noon a hearty dinner which may well happen to include two or three meats and vegetables; pork, perhaps, sausages, cabbages, cauliflower, brussels sprouts, dessert. At three-thirty the coffee or tea hour comes round again. In the evening a light supper is offered; more soup, meat, omelette, vegetables, and dessert. It is held, perhaps rightly, that the making of milk should be induced by the same nourishing food that was partaken of during pregnancy, and that no food to which the child was no stranger during those months will be deleterious to him in the mother's milk.

Some time during that day, also, the mother gets out of bed and stands on her own feet, with the protective arm of the nurse to reassure her. One adventurous patient, who has had two Freiburg babies, immediately dressed and went out to find social companionship in the *Liegehalle,* or rest room, where the steamer chairs overlook the garden and the sunset. Every day the time spent out of bed lengthens; by the fourth day it is not unusual to see a Frauenklinik mother out driving, and by the end of the week returning a reasonable number of calls of congratulation. The conserved nervous energy due to painlessness goes into the milk, as often as not, and into the readiness with which the woman returns to the routine of domestic life. She is, at the end of ten days, in her normal, and sometimes in better than her normal, condition.

It was this miracle of a painless birth followed by a miraculous recovery that Freiburg had to offer, on that June day when the first American mother entered it as a patient who had had five babies, none of them painless, to have her first painless child.

And such is, objectively, the method which, from the time of its first application to a human mother, has been developed to its point of highest perfection at Freiburg, in response to the demand of the women who, endorsing it among themselves, carried the purely local knowledge of it abroad. But it remained a local method, and it became a familiar event, at the Klinik, to see a Dämmerschlaf mother return from far countries for another confinement.

The amount of time and trouble for the staff which such a method involved is obvious; yet this time and this trouble continued to be freely offered, although the method was gaining little scientific recognition.

The statistical data grew; studies of special phases of the birth process under Dämmerschlaf were made and filed; but little by little the subject of Dämmerschlaf was subordinated in the reports from Professor Krönig's clinic, in favour of the subject of radio-therapy in which his colleagues shared his interest. The last Dämmerschlaf report on a study of 3,000 cases was never even published, though it may be pieced together from excerpts in German obstetrical journals which covered the congress at which the address was read. A few Dämmerschlaf-trained men went out from the Klinik, and continued to practise it in other cities; one or two country practitioners adopted it, as their practice was small, and they were humane in their obstetrical work.

The ban placed on the method by the great school of Berlin had effectively localised the practice of Dämmerschlaf.

But its employment in the Frauenklinik could not die out while the demand for it continued to fill the wards with

patients who wanted it; natives of Baden, and foreigners who heard of it by word of mouth and who came to Freiburg to get what they could not obtain elsewhere: a painless child and a miraculous recovery from childbirth.

Perhaps it is not too much to say that the custodians of this great and revolutionary discovery of science were the successive little groups of convalescent mothers who gossiped in the garden of the Frauenklinik, on sunny days, or who compared their babies in the nursery above; just as it may be that the influence of the Freiburg method might never have made itself felt in obstetrics in America but for the arrival at Professor Krönig's clinic, that June day in 1908, of the unusual patient who was to carry its message across the Atlantic.

CHAPTER II

Prof. Krönig's Talk to the Women of Freiburg

Professor Krönig's talk to the women of Freiburg has passed into tradition, in Freiburg. The spirit of the tradition lives, but of the letter it is impossible to find any but the most scattered notes.

It had seemed to us that if we could reproduce this talk, before the larger audience of the magazine-reading women of the United States, the argument for painless childbirth would be presented to them by the man who had fought for it.

Ultimately we found, not the notes of this talk, but Professor Krönig's talk to his students, which incorporated the same statements, a little less colloquially illustrated. This, together with interviews with American and Freiburg mothers, made what seemed to us a simple presentation of the work at Freiburg. The necessary translations were made in the two months which preceded the birth of "Peter" Boyd; the first draft of the article was made during his mother's convalescence; the last draft, as one of us vividly remembers, was revised in the twilight of the birth-room during the approaching birth of another American baby, afterwards known as the "Spaniard," from Lerida, in Spain.

The colour of our daily lives painted the picture. It was inevitable that sentiment dominated it; we were not scientists, but women assisting at the most overwhelmingly emotional consummation in women's lives. The ridicule which the medical press afterwards visited on us as sentimentalists seemed lacking in worldly wisdom. For the virulence of the criticisms showed that our story had gone home.

Freiburg is a small place. A walk from one extreme end of its venerable main artery of traffic to the other will take a leisurely ten minutes. Two mountains rise up at either end of the town. One is called the Schlossberg, and the other is called the Bromberg. The ascent of these mountains is the perpetual exercise of all Freiburg that does not go farther afoot, and you will scarcely find a woman in Freiburg who has not climbed them. They constitute, to a woman, a known measure of effort, just as a teaspoonful constitutes a known measure of quantity.

So, when a number of Freiburg mothers asked Professor Krönig to explain to them why it is becoming unscientific to allow pain in confinement, he explained in this way: he said that the actual normal muscular effort involved in bringing a baby into the world corresponds to a climb up the Schlossberg. But, for the modern woman of highly complex nervous organisation, the muscular effort is complicated with so much pain that often the pain itself becomes a factor of serious interference with the birth. And he compared the mother's muscular effort to bring her baby into the world in these conditions to a woman who might be obliged to climb the Schlossberg with a sharp nail in her foot.

ognition of the injuriousness of pain in childbirth, although with the eyes of a person who was not scientific she had seen the injuriousness of pain in childbirth exemplified in her own family.

She was to find that it was only one of many such statements from obstetricians of international reputation, and that many of the earlier ones were much more specific. But in its spontaneity, its sensitiveness, and the eloquence of its direct appeal to the younger generation who might have the opportunity in obstetrics for which he was still fighting, Krönig's enjoining on his young students to take account of pain as a pathological element in childbirth was peculiarly impressive.

"Of late," said Professor Krönig, "the demand made of us obstetricians to diminish or abolish suffering during delivery has become more and more emphatic. The modern woman, on whose nervous system nowadays quite other demands are made than was formerly the case, responds to the stimulus of severe pain more rapidly with nervous exhaustion and paralysis of the will to carry the labour to a conclusion. The sensitiveness of those who carry on hard mental work is much greater than that of those who earn their living by manual labour.

"As a consequence of this nervous exhaustion, we see that precisely in the case of mothers of the better class the use of the forceps has increased to an alarming extent, and this where there is no structural need of forceps.

"When one goes into the records of the cases of women like these concerning their previous confinements, one is almost driven to the conclusion that spontaneous birth is, in their cases, practically impossible. It is by no means

unusual to hear that the forceps had to be used at every previous confinement. Neither structural difficulties nor muscular weakness had indicated the necessity for operative interference. The forceps had been used simply and solely to shorten the pains of labour.

"On the occasion of a meeting of the Berlin Obstetrical Society, it came to light that obstetricians practising in the best society of Berlin were obliged to use the forceps in nearly forty per cent. of their cases.

"In *theoretical* medical instruction, the 'rescuing' forceps finds no place. In practice the conditions are different.

"The cases available for obstetric study in the hospitals consist, for the most part, of women of no great intelligence, who earn their bread by manual labour.

"In private practice we not infrequently have to do with women of nervous temperament who declare themselves incapable of enduring the pains of labour to the end. A medical man often, in such cases, finds himself before the alternative either of ending the delivery operatively with the forceps, or of retiring in favour of another doctor.

"If we take the trouble to sit at the bedside of women of some sensitiveness during the whole course of labour, and to observe the state of their nervous system, we are compelled to admit that in their case such nervous exhaustion does really set in, that all power of will to hold out till the end of birth is paralysed.

"I hardly believe that any one who takes the opportunity of observing a birth in the case of one of these women, from beginning to end, would afterwards agree with the statement that the pain of birth is a physiological pain

which is really of advantage to the mother and must not be reduced. Such a statement can only be made by those clinicians who, having to do with too large a number of cases, have not taken the trouble to follow the nervous condition from beginning to end of labour, and who content themselves—as indeed is necessary when working on a large scale at high pressure—with ascertaining occasionally how the case is going on.

"When Steffen, on the occasion of a discussion about the reduction of pain in childbirth gave utterance to the statement, based on his experience of a large number of cases in the Dresden Woman's Hospital, that as a matter of fact he had never felt any necessity for lightening the pain felt by a woman in childbirth, this is only to be explained by the fact that he was either quite callous or that when the screams and groans of the woman became too loud he left the room.

"Acute pain at birth cannot, in the case of sensitive women, be termed physiological, for it frequently occasions a condition of severe exhaustion even after birth.

"Any gynecologist who considers that he ought to be something more than merely as good an operative manipulator as possible—who thinks, that is, that he should observe the nervous condition of the mother—will not infrequently note that neurasthenic symptoms appear in immediate connection with the delivery. One is only astonished that long-continued exhaustion does not occur more frequently, when we realise what a sensitive woman has to endure during her confinement, even taking into consideration the mental impressions alone.

"The preliminary pains are probably stood well. But

with their increasing frequency and violence the moral resistance breaks down. She feels her strength giving way, and does nothing but beg the doctor to use the forceps and put an end to her agony, and longs only for the moment when she will be released from pain by the chloroform or ether.

"If, as often enough happens in private practice, the forceps is used without anæsthetic, because the doctor is afraid to trust the continued administration of the anæsthetic to an inexperienced helper, then, in addition to the ordinary pains of birth, the woman has the pain of the operation. The loss of blood, especially in the case of a first child, is relatively great, and bodily exhaustion is thus added to mental.

"It is true that robust women can stand all this without consequent injury to their nervous system; but it is equally undeniable that, if there is the slightest inclination to a neuropathic condition, such severe bodily and psychical injury is the cause of a long period of exhaustion."

It seems to be a fact that a man who is hypersensitive to pain either becomes a great doctor, or else does not enter that profession.

At the bedside the average practitioner called to a confinement meets its frequently tragic emergencies with a kind of fatalistic philosophy. His bad cases usually come in quick succession, after which he has some months during which the terror and despair of the bad period efface themselves, and he once more breathes freely, and reassures the prospective mother and makes light of her ap-

proaching ordeal. He rests in the faith that Nature, not science, is the great obstetrician: "Let Nature take care of itself."

In fact, the recognition of the pain element in childbirth is systematically subordinated to the joy element which in the majority of cases follows it. A young trained nurse once said that she chose obstetrical work instead of "sick" nursing, because everybody is so happy in the family where there is a new baby.

That the joy of the new baby is frequently the prelude to its mother's lingering invalidism for a few months or a year is accepted as a part of God's will, and the invalidism meekly borne. Rarely is it laid to poor obstetrics; still more rarely to the pain element in the confinement in which the patient showed grit for which she was warmly praised by the attending practitioner; that "biting back the cry of the pain in self-scorn" that is described by Mrs. Browning "when the man child is born."

It took a very imaginative scientist to discover that this pain of travail so abundantly testified to in literature was a profoundly expressive literary symbol, and a great test of stoicism; but a most destructive adjunct to the physiological phenomenon of child-bearing.

In the middle of the last century a scientist with the eloquence of Krönig for the first time puts himself on record in medical literature. James Young Simpson, the first supporter of painless birth, characterises pain in childbirth as not merely a disagreeable accompaniment of birth, but as "a dangerous and a destructive one."

From this time down to the present, pain is acknowledged by the obstetrician; but it is acknowledged mostly

to belittle it. For one Simpson there are several Steffens of Dresden, just referred to by Krönig. Steffen is quoted in another place as "knowing no more pleasing sight than that of a strong, healthy woman giving birth to a large first child in strong and painful birth pangs."

"There is too much said about this pain of childbirth," declares an American obstetrician. "You ask any woman who has had a child, and she'll tell you there's nothing to it. I've never observed that the painfulness of the first labour kept a woman from having a second."

"Yes," assents another thoughtfully; "a woman with plenty of grit would always rather carry it through without anæsthesia."

Such men seem to wash their hands of the destructive nervous shock that accompanies the grit. They see the pain. Their statements show it; but they persist in taking it lightly and in speaking of it flippantly.

It is this type of practitioner whom the French obstetrician Audebert had in mind when he enumerated amongst the advantages of painless birth that it prevents the brutalising of the obstetrician by the daily observation of agony. He adds that it spares the sensitive obstetrician the nervous strain which the sight of unrelieved agony puts on him.

How serious this pain really is has been quite forcibly set down in words by Simpson. This inventor of chloroform lived in a day when surgery without anæsthesia was as familiar a sight as it is fortunately rare to-day. So, knowing that whereof he spoke, he said: "The total sum of actual pain attendant upon natural labour is as great if

not greater than that attendant upon most surgical operations."

From the fifteenth century come the quaint words of the monk physician Heironymus, who could grasp and sympathise with the pain he was helpless to relieve. *"Mulier in partu maximos et fere intolerabiles sustinet dolores."* (Woman in childbed has to endure the acutest—nay, almost intolerable—sufferings.)

One hears occasionally of a painless birth that has been naturally painless. Most of this natural painlessness is traced by the physician to pathological conditions; among them paraplegia, tabes, myelitis, coma of puerperal convulsions, placenta prævia, and œdema of the vulva. Rarer still are the cases of a few laxly built women, mostly those who have borne more than one child. There sometimes arrives a time in a painful birth when the capacity for pain seems to be exhausted; this painlessness is followed by the same exhaustion and shock as a painful birth, and while the mother takes it lightly, saying that the pain was as nothing to the joy that remained, she is none the less an invalid for some months.

A few obstetricians believe that pain in childbirth has a physiological function. Its practical usefulness to the physician has been evident from the way that the older school has admitted that it guided its forceps by the cries of pain. But setting aside this not very professional use, which is somewhat like the dentist, the only serious argument ever advanced for the physiological value of pain is that lusty cries increase the oxygenation of the maternal and fœtal blood; with the cessation of these cries there is lessened air admitted to the lungs at each inspiration.

In the case of Krönig's method the cries, it may be pointed out, do not entirely cease, instantaneous forgetfulness, not painlessness, being the Dämmerschlaf condition.

But this case for the aeration of the blood by pain seems almost farcical beside the case for the destruction of vitality by pain, for the classic argument in medicine against pain is that it exhausts the principle of life.

And this is no less true of the pain of childbirth than of any other as the exhaustion following childbirth in pain is as great as that following any other form of pain.

"To many patients," said Charles Kidd in 1860, "there is an amount of suffering and pain in childbirth, attended with a sacrifice of vital force that we cannot estimate sufficiently. By artificial painlessness this nerve force is saved, and the patient enabled to resist the causes of fever and inflammation."

This shows the tremendous importance of removing the weakening element of pain in pathological cases.

But pain itself brings a pathological element into normal birth. It is the nail in the shoe that Krönig described so vividly to the women of Freiburg. That is, it is undesirable, not only on humanitarian but on scientific grounds. It interferes with the progress of the birth.

Krönig's method was taken up in America by a few obstetricians, and it is referred to among them as Hyoscin Sleep. This was in the days, it must be said, when the inferiority of hyoscin, a drug of the same family, to the pure scopolamin was not known. In one of the most illuminating reports that have been made on the subject, "The Hyoscin Sleep," by W. H. Birchmore,

the ways in which pain may be a handicap to a birth are vividly brought out. Birchmore's great idea is that obstetrics is handicapped by the persisting pain element, and that until pain has been artificially eliminated it can never take its place among the highly developed medical sciences. He hails the hyoscin sleep as "that on which the improvement in obstetrics for which we have all been waiting may be based." He shows you how pain is an impediment by a series of observations on a series of painless births. "The physicians watching these births noticed the steady, slowly increasing and tremendous force exerted by the abdominal muscles. They observed with astonishment the helpful and purposeful positions that the women took, though soundly sleeping, in order to make the best possible use of their muscles. One physician who had attended many labours said he had never seen anything like it before. Another experienced obstetrician looked on in wonder. He remarked afterward: 'It was as if I had seen the natural action of a woman in labour for the first time.'"

The convulsive and irregular pains which cause perineal rupture and other injuries were entirely lacking, and in their place were observed "a dozen small, slowly stretching pains" that carried the birth on in orderly progress.

Not only was the mother's voluntary action made ideal, but the involuntary muscular contractions were augmented and regularised; for "secondary insufficiency" of the birth pains due to exhaustion from suffering, was not experienced. Dilatation of the birth canal was furthered, and relaxation of the passages prevented laceration.

The literature on painless birth is full of these exam-

THE SON OF A FREIBURG UNIVERSITY PROFESSOR. **While professional etiquette forbade giving the names of men connected with Baden University, the hearty co-operation of wives and mothers in the faculty furnished many photographs of their Dämmerschlaf children.**

THE FOUR "SCOPOLAMIN" CHILDREN OF FRAU BISSINGER, one of the women of Freiburg whose enthusiasm for Dämmerschlaf, together with her wide acquaintance, helped us to collect pictures of over two hundred Dämmerschlaf children.

ples. Pain often lengthens labour by preventing the mother's voluntary muscular action; making her "hold back" instead of aiding. In some cases pain causes lacerations on account of the violent and spasmodic efforts by which the mother strives to end her sufferings. Exhaustion from pain often causes a cessation or slowing of the involuntary contractions known as secondary "insufficiency," and makes it necessary to interfere with forceps or other operative measures. Another indication for forceps is where a narrow pelvis would require "waiting" to deliver the child naturally and the mother's suffering is too great to wait. It is not a mere coincidence that Krönig, who worked out the Dämmerschlaf, is one of the greatest international authorities on the "waiting" method.

In many ways the pain in such natural births as these injures the child also. Forceps extraction sometimes injures him, and, as Krönig has pointed out, forceps are to-day used more and more frequently to shorten pain. A birth unduly prolonged may asphyxiate him; the mother's inability to wait has sometimes necessitated craniotomy, or her spasmodic frenzied efforts have done the baby harm.

An American obstetrician estimates that operative frequency under artificial painlessness is only half that under pain.

The exhaustion following pain in childbirth is known as its traumatic shock. What the elimination of this shock means is shown by the convalescence of Birchmore's no less than of the Frauenklinik mothers. For a physician observing some of Birchmore's mothers said to another: "To see them it appears a preposterous proposition to say that any one of them had just given birth to a child."

Of the convalescence at Freiburg under the same painless method Krönig said to his students:

"Many of you have taken advantage of the opportunity of seeing mothers on the day after birth out of bed, and you will have had the impression that by reducing the suffering we have not only conferred great benefit on mothers during delivery, but at the same time in consequence of the absence of suffering during delivery the condition of the mother during convalescence is very much better than ordinary."

This simple and conservative statement refers to a phenomenon which to mothers who have borne babies outside the clinic seems a miracle. For a woman's nerves are frequently so broken down by normal confinements in consciousness that she suffers not merely from exhaustion but from an acute neurasthenia, from which recovery is slow.

"There can be no possible doubt," says Gauss, "that birth loses the character of an injurious trauma to the same extent as the physical suffering and the mentally injurious impressions are reduced or even completely abolished."

If Krönig's talk to the women of Freiburg failed us, directly, indirectly it served us well; for the want of it set us to work on the fuller address of Professor Krönig to his students, and led us directly into that extraordinary report which, standing alone in the annals of obstetrics, had originally introduced the Dämmerschlaf to the medical world: *Gauss, 1906.*

CHAPTER III

Fear and Pain: The Psychology of Maternity

Fear has occupied less space than pain in obstetrical literature. Where it has been spoken of, it has almost always been discussed as the "hysterical fears" of pregnancy.

The obstetrician has been unable, or unwilling, to distinguish between an abnormal nervous condition sometimes observed at that time and a real nine-months' brooding on a painful and perhaps a dangerous ordeal.

For the one sensitive obstetrician in our experience who out of his own observation of what childbirth was like said that if he were a woman he would "hang himself in the first month of pregnancy," we know two women who did actually make way with themselves, and we know countless numbers who avoid maternity for this reason.

Birchmore says of scopolamin: "Until it was discovered, fear dominated pregnancy, and the pains of maternity were a horrid and uncontestable truth."

But Krönig is almost alone in attempting to express the woman's sensations. He says in his address to his students:

"The ground for the breakdown following birth is prepared even earlier during the period before birth by numerous bodily complaints—sickness, loss of appetite, and

so forth. Hypochondriacal moods, it is well known, often preponderate in women during pregnancy. The woman has heard from her friends how difficult the birth of a child was and how great the pain; how finally the doctor used the forceps and then how long puerperal fever followed the birth. When she herself has to give birth to a child the first preliminary pains are probably stood well, but with their increasing frequency and violence the moral resistance becomes exhausted. The woman feels her strength give way and does nothing but beg the doctor to use the forceps to put an end to the agony. She sees the preparation of the forceps, she sees the excitement in the expressions of her relations, and longs only for the moment when she will be released from pain by the chloroform or ether. It is true that robust women can stand all this without consequent injury to their nervous system, but it is equally undeniable that if there is the slightest inclination to a neuropathic condition such severe bodily and psychical injury is the cause of a long period of exhaustion."

Krönig recognises the traumatic shock of childbirth as going back as far as pregnancy.

Butler follows this traumatic shock on beyond birth and convalescence. He says that scopolamin "spares the mother the psychic traumata of childbirth. These are known to be the chief exciting causes of nervous and mental diseases in women besides being an important factor in marital unhappiness."

Judged by some women's own experience, their subjective traumatic shock of childbirth goes back before pregnancy and poisons youth; it extends after the first child's birth throughout married life.

"I wish that one of you would come to talk to a woman who has come from South Africa," said the head nurse at the Frauenklinik. "Some one has been telling her that her child will be injured if she has the Dämmerschlaf. And she has come so far to get it."

One of the Freiburg mothers promptly volunteered. In the *Liegehalle* she met a frail-looking little woman with a sad face and marvellously expensive clothes whose lace jabots softened but could not dissimulate the fact that her baby would be born very soon.

"It was a terrible trip," admitted the stranger. "But it was the only thing I could think of to do. We wanted this baby so much, and the last birth I went through was a horror. I could not face going through such an ordeal again."

The Freiburg mother showed the stranger over the nursery, reassured her about the safety to the child and the real painlessness to herself, and she went back to her hotel comforted. That night she took a taxi to the clinic, and her baby was born in the early morning. Twenty minutes after the birth she was awake for a while, and asked to see one of us who happened to be occupying an adjoining birth-room.

"It was a miracle!" she cried. "I did not know a thing about it until they gave me the baby just now."

Fear had dominated her pregnancy, but she had had the hope of Freiburg to look forward to. And now she will never again know that helpless fear.

There are women who would dearly love to have a second child, feeling that it would be better for the first child to have a brother or sister; but they absolutely refuse to

go through another experience of childbirth. Their nerve has been broken exactly as has that of the engineer who has been in a railroad wreck.

One young woman feels sure that fear learned through one terrible experience brought on a miscarriage when she became pregnant a second time.

"The doctor kept saying to me: 'You mustn't worry. Your mental state may bring on a miscarriage. Just stop worrying. If you are going to lie there and worry we can't keep you from losing your baby.' "

She did worry, however; she lay and wondered how she would live through another such ordeal as the one she had been through; she had had thirty-six hours of agony, and then when it was seen to be impossible for the baby to be born alive the baby had been sacrificed. She describes the terror with which she heard the doctor say that he would use the forceps. "If they had only been a little less cold-blooded about it," she says, with a shiver. At one moment, in a paroxysm of agony, she tried to throw herself from a window, and was caught and brought back to bed. When the child was finally taken, they could not show it to her. She has brooded over those days of useless torture ever since. "You get a feeling of bitterness," she says. "That is the only thing I can call it. You went through all that—and they destroyed your baby, and you don't dare have another."

One woman, having gone through a like experience, lived in such terror of pregnancy that it preyed on her; one day it suddenly came to her that the only way to have perfect security was to drink off a good strong poison and end the burden of foreboding then and there. She did so.

Another young woman, a bride of a year, was one of those highly organised nervous temperaments of whom Dr. Newell says our American society is full and of whom he declares that he never classes them as normal cases until they have proved definitely that they have nothing neurasthenic about them. Upon finding herself pregnant, her fear took one comprehensive look at the long period of pregnancy with its probable outcome of a difficult birth. The love of her husband, the potential long and happy life with wealth and position to draw upon, hung for an hour in the balance, and fear won. She was found dead in her bedroom with the gas turned on like any tenant of a third-floor-back lodging house in an O. Henry story.

The fear of pregnancy is a horrid and incontestable fact, in the experience of many women.

The palliatives which fill the literature of hygiene for the pregnant mother read like the sentimental rubbish of mid-Victorian novels.

Only a Simpson, a Birchmore, a Newell or a Krönig rises above the painful inadequacy of this sentimentalism with a recommendation that fear and pain be considered and dealt with in a spirit of scientific respect for their far-reaching consequences.

We have already given the obstetricians' analysis of pain as an impediment to the birth process and an injury to the mother's health.

For two generations in all countries, from Simpson to Krönig, from Ribemont-Dessaignes of Paris, to Polak of New York, obstetricians of insight and sympathy have observed the facts set down.

The American mothers who are to-day effectively re-

belling against birth pain do not need superior sensitiveness to realise its drain on their vital forces. They have each her own personal experience to teach her the fear and the pain of childbirth.

These are most vital in their lives. Childbirth is to the majority of women as certain and often as dreaded as death; the joy of maternity as hard-won as the joys of paradise.

Medical literature deals with the pain in its physical effect.

The effect on the nervous system has been given little study, except as it prolongs convalescence, or as it simulates uterine disease.

Obstetricians know that pain is one of the causes of puerperal psychosis, the madness or delirium that sometimes follows childbirth. But they do not know to what extent the nervous breakdown due to brooding fear during pregnancy causes these psychoses.

Yet one form of psychosis in pregnancy is aversion for husband or children.

Whatever the doctors do not know about the cause of psychoses, there are many women who ascribe them frankly to a legitimate fear that from brooding came to take morbid forms.

One woman, an enthusiast for Twilight Sleep on this very psychological ground, tells how her fear of the ordeal gradually developed into a fear of death, until each night she dreamed of herself laid out in her coffin. After the birth the brooding fear implanted in her remained. She was a subject of both pregnancy and puerperal psychosis

which she will always lay without a moment's hesitation to her real legitimate fear of childbirth.

This woman also is one of those who lay great stress on the effect of the mother's state of mind on the unborn child. To this day she watches her grown son and fancies she detects in his temperament under excitement the abnormal nervous symptoms of her pregnancy.

The girl's foreboding of childbirth is expressed for all time in the Roman poet Catullus' Marriage Hymn, where the girls fight the eager boys before the altar of Hymen, in a war of words that ends in their magnificent defeat.

This is one class of women. Many healthy young women of good courage approach childbirth as a great adventure. Others forget its pain in the desire of maternity. Some of these retain their courage through successive births, though few of them have painless births. Many mothers forget; for there is a slow-working deceptive form of natural amnesia which often follows a birth, but does not serve at all to obliterate its physical shock. The picture of the birth is displaced in their minds by the picture of the child.

One of us personally lived through a sister's confinement. It was over twenty hours of hard labour followed by two months' convalescence—a breakdown solely due to an injury to the nervous system. Not very long after the recovery, the mother was heard to say: "Really, it was not so bad!" And presently when she was to have another she had forgotten the pain entirely.

But comparatively few mothers forget. It is the foreboding, experienced mothers, many of whom approached

the first birth with good courage, who give a tragic reality to the fear and pain of childbirth.

We saw many of these who came to Freiburg. One woman would not believe that painless birth was possible. "I am not afraid of death, you understand; but I cannot go through that again," she said breathlessly, beseechingly, to the head nurse. "If it grows too bad I trust you, I count on you, to put me out of my pain. I *want* to die."

We saw at Freiburg also the gratitude of one husband when painless childbirth freed his wife of the brooding dread that had hung over her since her first child was born.

Frau von Stein, Goethe's friend, was the mother of many. She herself speaks in her memoirs of the unhappiness brought into her life by the constant apprehension of childbirth.

"There is no real ill in life," said Mme. de Sévigné, who had borne children, "except severe bodily pain. It racks both body and soul."

It is not for nothing that the word hysteria comes from the Greek word for womb. It is this racking of the soul, this distortion of the mind by the nerves which causes imaginary symptoms of uterine diseases.

It is from these cases that that army of suffering women come to whom Dr. Krönig's assistant, Gauss, refers, who "although they exhibit no signs of definite disease of the organs of generation, yet consult the gynecologist because they attribute the general nervous complaints caused by the memories of child-bearing to these organs." He believes it very likely that a nervously high-strung woman might often be spared the undesirable illnesses following

childbirth merely by blotting out her memory of the birth itself, in the Dämmerschlaf.

But the soul is not only racked nervously; the very quality of the mind itself is sometimes affected by childbirth.

Not a few women of good normal minds have gone to seed, become dumb, patient, brooding animals after the exhaustion of a succession of painful births. Of these we say: "It is a pity she has fallen off so mentally! She promised so well when she was a girl." Her own life has been shut off from her by life-giving.

Only when the function of maternity is made less exhausting by the painless births of the future shall we know to the full extent how much this accounts for the irritability, superficiality, and instability alleged against women. We may find that it has been a potent factor in retarding their development to a position of equality with men.

For women have always been handicapped by childbearing. It is the great literary "exemplum" of pain. "Fear came upon them," says the psalm, "and pain like to the sorrow of a woman in travail."

Until they saw relief in sight, women have borne their fear and sorrow with a good grit. Amongst those most eager for Twilight Sleep are mothers who want to save their married daughters from what they endured. One woman wrote us from a Denver hospital where she had just had her child with pain, telling of a Twilight Sleep hospital in California that she could never hope to get to herself.

Women of all classes, from the sensitive woman of the upper class to the neurasthenic and anæmic factory girl,

of their bodies to preserve their high personal courage they sacrifice some of their usefulness to the community. Nearer home they sacrifice their child.

A mother waking from Twilight Sleep was asked by her physician whether she did not lose a joy in missing the first cry of the child.

"Lose a joy!" she cried. "This is the only one of my children that I have been in any condition to enjoy when he first came into the world."

This was the first of her children that she had been able to nurse and the first that she had been well enough to take care of herself.

These are some of the things that motherhood under painless birth means to the child.

"I should think," said one woman thoughtfully, after hearing a talk on Twilight Sleep, "I should think that the mother's peace of mind while she was carrying him could not help having a wonderful effect on the baby." The providing of peace of mind is an essential element of prenatal care, both for mother and child.

The American woman of to-day believes that the weariness, the physiological depression, the disturbance of function, the giving out of nourishment and energy, the loss of good looks, the withdrawal from the customary resources of social life in pregnancy is enough of a sacrifice to the future.

She does not believe that it is any longer necessary for that year of her life to culminate in a brutal struggle and a domestic shambles, she believes that it should culminate in a rite to motherhood.

Scopolamin that has come down through the ages is first

reported in the religious ecstasies of the Greek gods. The priestesses of Demeter, the Earth Mother, performed their rites under its intoxication. But every mother, from those of primitive peoples who have tried to procure this pain-obliterating ecstasy through philtres, incantations, charcoal fumes or alcohol, up to the mother drifting cloudily under the Dämmerschlaf, becomes a priestess of Demeter, lifted out of herself into the sublime primal function of her Mother Earth.

CHAPTER IV

Gauss and Dämmerschlaf: 80% Perfect

When it became clearly impossible to obtain Dr. Gauss's reports by the simple expedient of applying for them at the Frauenklinik, recourse was had to the second-hand medical book-shelves of the Freiburg bookshops. A faded, dust-stained, dog-eared copy of Gauss's 1906 report was our ultimate reward.

Day by day, as this report unfolded itself to us through the translation of the English instructor, and we took it down, there grew from it the personality of the man who had worked out the Dämmerschlaf method.

We, as patients and relatives of patients, ourselves knew Gauss as he flashed in and out of our room at the Klinik; as we passed him rushing across the garden with his arms full of classroom papers; as his automobile tore past ours on the way to the aviation field where he was to make an ascension, for he was attached to the aviation corps. One of his colleagues said drolly, with a glance at the hall clock in the private ward: "At this hour you'll find Dr. Gauss in the ether of the operating room, or the ether of the upper air."

We looked upon him as the enthusiastic social factor of the medical faculty, as to whom there was always some new stirring anecdote; he would reappear from Berlin,

where he had been sent to deliver an address, with a perfectly new dance step, or from Switzerland, where he had been sent to rest, with all the physical testimonies of a fall from a glacier.

Lequeu, one of the early French students of scopolaminmorphin, refers to Gauss as though he were the mechanical medium through which Krönig carried out his revolutionary ideas.

Lequeu presents Gauss as a drudge, doing automatically the routine work of his position.

The Gauss whom we grew to know through our patient, plodding study of the 1906 report was neither a butterfly nor a drudge. He was no perfunctory candidate for a professorship, accumulating facts under set classifications whose meaning was left to others to analyse. There are many men of this kind in all universities, and their work is dry and useless except to the man who knows what they are to prove beforehand. Gauss had a dozen of these working for him, recording all the delicate details of the great experiment he was making: blood loss, duration of birth, pain curves, objective signs of the state of consciousness, infant's heart and breathing. These worked mechanically, leaving understanding of their results to him.

Gauss was never told what to find: but simply to find what was best for the mother and child. It was his discovery that in Dämmerschlaf, the technique by which is induced and maintained a state of instantaneous forgetfulness never before recognised as anything but an accidental passing phase in the progress from consciousness to unconsciousness, there were possibilities which might be developed into an ideal method of painless birth.

From the great report in which, in 1906, he gave the results of his work, it is evident that Gauss approached his investigations with as keen an imagination, and as sensitive an understanding of pain, as Krönig. He never loses that imagination throughout the infinite dry plodding which his task necessitates. For him details are illumined by his underlying purposes.

And so, just as some diseases and therapeutic methods are named for the doctors who first recognised them, the artificial Dämmerschlaf state of clouded consciousness should be associated with the name of Gauss. It was he, and he alone, who saw it as the ideal state for the birth process, and he, and he alone, who worked out with infinite delicacy the method by which it should be induced and maintained.

All through history the narcotic qualities of the atropin-hyoscin-scopolamin family had been recognised; sibyls and witches have used them in their rites.

But they had taken a place among surgical narcotics generally in combination with morphin as scopomorphin for only a few years when, in 1903, the obstetrician von Steinbüchel, of Gratz, used a minute hypodermic injection of scopolamin combined with morphin, instead of the customary simple morphin, to give short intervals of sleep between the pains of a hard labour. He found to his amazement that the mother was not awakened by the pains, which kept on right through her sleep. Morphin alone in sufficient dosage to have kept her sleeping might have killed her, but the minute quantity of scopolamin added roused the small dose of morphin to greater efficiency, lessened its poisonous qualities, and added its own narcotic

qualities, producing a result far beyond his expectations.

The news of von Steinbüchel's use of scopomorphin ran through the world of obstetrics. Krönig was one of those who took it up and used it most cautiously and effectively. But results were not uniform. Keeping always to their minute dosage von Steinbüchel and Krönig had many cases which had no pain relief, or incomplete relief. Krönig, fully determined on painless childbirth, felt that these were only crude beginnings, but that on this basis a more perfect method could be worked out.

In Gauss he had a man with the genius both for taking infinite pains in working out details and for grasping a great idea.

Physicians constantly speak of "beautiful" or typical cases of some horrible pathological condition or another. It must have been beautiful indeed to Gauss to see the typical or perfect Dämmerschlaf childbirth with the pathological pain element removed. It came gradually to be exemplified by mother after mother, a Dämmerschlaf perfect in respect to painlessness, to normal birth process, to safety of the baby, and in respect to state of consciousness such that it could regulate and maintain itself.

Until he was reasonably secure about safety Gauss did not deviate much from von Steinbüchel's dosage.

His first experimental mothers were dogs. Very few laymen like to think that science learns to study the physiological phenomena of the human body at the expense of pain inflicted on animals. In this case, however, experimentation took quite the opposite form of putting partial anæsthesia at the service of the "lower" animals. The little animals "people" brought to the clinic to have their

babies were treated in the light of patients. One day a new nurse, very tired indeed and nervous from a first day's bewildering demands, found that Dr. Gauss expected her to assist at the birth of puppies whose mother was enjoying scopolamin-morphin. It was too much. Oblivious of discipline and etiquette, she fled to the head nurse in a storm of tears and protest. The head nurse, remembering perhaps her own first days of training, excused her, and although it fell rather to one side of her own activities took the girl's place.

Geburten in Künstliche Dämmerschlaf (Archiv für Gynæcologie, Band 78, Heft 3, 1906)—*Gauss, 1906*—is his study of his first 500 human mothers under the experiment. It is not only an authoritative document, but it has a picturesque simplicity of style and an element of romance because of its intense human interest.

This report, together with the report on a thousand cases published the next year, and a third in 1911, constitute one of the most careful studies in medical literature of an experience carried on under uniform conditions in one place.

Nothing on such a scale had been done before. With a supplemental report on several hundred cases the studies cover 3,600 of the 5,000 mothers delivered under Dämmerschlaf at Freiburg up to the present time. There is an unpublished report on 500 more, but this has been seen only by physicians.

Their numbers are so large as to remove the Freiburg Dämmerschlaf from the experimental class and show it a proved experience which can, as Gauss says in one place,

"serve as a touchstone for all other obstetrical use of scopolamin-morphin."

Gauss, 1906, covers the cases by the study of which he came to recognise the value of the state of amnesia or instantaneous forgetfulness, and worked out the technique by which it could be maintained. We shall leave Gauss himself to describe the condition and the working out of his technique.

In his next series of cases he perfected the proportions of the two drugs, reducing morphin to the minimum, and more perfectly adapted the dosage to the individual temperament.

Gauss, 1906, contains the idea roughly blocked out; later studies show it in finished perfection.

Dr. Gauss's description of the stages by which he learned to recognise and perfect Dämmerschlaf also includes the description of two stages of partial Dämmerschlaf which are represented in the statistics of the later studies. They were included in 1906 under the general head of pain-lessening.

"The first sign of the action of the drug," says he, "is pronounced weariness which very soon passes into a peaceful sleep occupying the whole of the pauses between the pains, but out of which the patients are startled by every pain.

"The suffering during the pains is indeed at this stage clearly perceived as such, but is considerably reduced in fact, and—at least in the case of critical and intelligent people—also subjectively. At this stage I have often heard such spontaneous remarks as: 'How nice it is to be conscious of the pains, but to feel no suffering.'

"Gradually further signs of the commencing action of the drug occur: thirst, with a dry feeling in the mouth and throat, flushing of the face, occasionally slight twitching in the flexor muscles of the fingers, and sometimes a certain degree of motor restlessness. After longer action and sufficient dose, the sleep becomes deeper, so that even during the pains the patients do not become fully awake, and the only signs of the pains are contortion of the expression muscles of the face; slight groaning.

"Consciousness is at this stage fully retained. The patient can remember exactly anything done to her. It is this stage that those who have hitherto championed the scopolamin-morphium semi-narcosis regard as the goal to be aimed at.

"But in consequence of the results of my cautiously made investigations, I have gone further.

"Only a slight deepening of the semi-narcosis is sufficient so to cloud the consciousness without entirely abolishing it, that the final result of a skilfully graduated dose is a kind of artificial fuddled condition, the principal characteristic of which is a complete amnesia extending over the whole process of birth.

"I said to myself, it is undoubtedly a great advance to be able to diminish the suffering of the mother. But in spite of this, every patient would have the impression in consequence of the continuous increase in the intensity of the pains up to the end of the birth, that her sufferings, in spite of the injection, also increased. Thus, a great advantage to the patient would often be greatly underestimated by her, especially in the case of inexperienced mothers at the birth of the first child.

"As, however, a slight increase in the dose injected is sufficient to produce total loss of memory of the sufferings during birth, and of all the occurrences taking place while the dose remains effective, there seemed to me to be no doubt that the object of the 'semi-narcosis' must be to put the patient into that kind of clouded consciousness which she afterward is unable to remember.

"It is this point which distinguishes my investigations and results, in principle, from those of other obstetricians, who were all satisfied with having reached only painlessness, or, to speak more accurately, a sort of sub-painlessness.

"The patients react in very varying manner whilst in this condition of clouded consciousness (Dämmerzustand).

"The majority of the patients impress one as being indeed sleepy, but otherwise quite normal. Every pain is accompanied by clearly perceptible if often only slight expressions of suffering. The pains and the accompanying sufferings are referred to and felt clearly as such. Every question is perhaps sleepily but nevertheless clearly answered.

"In this stage nothing beyond the very pronounced weariness of the patient strikes the unprejudiced layman or even a medical man who was unaware that an injection had been given. So much the more astonishing is it subsequently to learn that the patient whom one believed to be completely conscious has, after the birth, not the slightest idea of what she has just been through, or of the conversation held with her.

"The term semi-narcosis does not do justice to the peculiarity of this most curious condition of consciousness,

"is a narcotic condition of extremely limited breadth, like a narrow mountain crest. To the left of it lie the dangers of too deep effect, with unconsciousness and absence of birth pains; to the right the danger of too shallow effect, with retention of consciousness and sensibility to pain.

"What we term consciousness is the sum of the simultaneous mental processes into which internal and external stimuli are transformed. Derangements of the consciousness are consequently pathological deviations from the regular course of these mental processes, which can exhibit various degrees of clearness according to the magnitude of the liminal value. A clouding of the consciousness in which the clearness of consciousness falls below a certain standard, we term 'Dämmerzustand.'

"Owing to the fact that the associative bridges between the consciousness during the term of this condition which we have just defined, and that of the waking condition, are for the most part broken down, there is a more or less well marked defectiveness of memory for events occurring during the befoggled condition; the same kind of defect which we also observe in the amnesia occurring after scopolamin-morphium injection.

"Amnesia in general is a derangement of the memory which may take either of two completely different forms.

"For we distinguish between weakness of memory, which consists in a diminution or loss of the capacity for remembering past impressions, and the derangement of perception which is characterised by limitation of the formation of new memory pictures and images. In the amnesia produced by scopolamin-morphium the retention

of already formed memory pictures and concepts is not affected, but only the formation of new ones.

"It must consequently be also conversely possible by testing the capacity of perception to arrive at conclusions as to the subsequently appearing amnesia and so as to the intensity of the action of the scopolamin-morphium at the moment.

"My at first not very sanguine expectations were confirmed by the favourable results of the experiments. The so-called scopolamin visit always paid to the patients after they had fully returned to consciousness in order to ascertain the final effect led regularly to the result that amnesia also set in as soon as the derangement in apperception began.

"Since that time I have guided myself as to dosing almost altogether according to the variations of the carefully tested capacity of apperception, and have, when these tests have been properly carried out, never been misled as to the state of matters at the moment.

"In the rare cases in which the carrying out of this presented difficulties on account of the dementia of the patient, or for other reasons, I observed the reaction to pain of the pupils, and the locomotor ataxia and utilised them as very welcome and valuable auxiliaries.

"The value of these auxiliaries is further increased by a certain regularity which a systematic observation of their order in time would seem to show.

"The power of apperception is the most delicate indicator for the beginning of the action of the drug. Then come in order of sensitiveness, the locomotor co-ordination and the pupillary reaction. The maximum action was

consequently reached when the pupillary reaction ceased whilst the Dämmerschlaf condition had already begun and was closely related in time with the cessation of the powers of apperception.

"It is clear that accurate checking of the intensity of the action of scopolamin-morphium will not always be so very easy. Curiously enough it is most difficult in the case of extremely demented and of highly intelligent persons. But an effective maintenance of artificial Dämmerschlaf is impossible without both a continuous and skilled testing of the condition as to consciousness at the moment. In cases therefore where it is impracticable for the medical man or—as is now done in the Freiburg clinic—for a skilful and well trained, experienced obstetric nurse to keep a close observation on the whole course of the birth, nothing but repeated failures are to be looked for in the general results.

"I had myself enough and to spare of such failures until I had learned to carefully eliminate every factor which was interfering with the action of the injections.

"The first necessity in my opinion is that the patient should as far as possible be shielded from all powerful stimulation whether mental or physical. It is consequently best to have the patient in a room by herself, where nothing disturbs the quiet beyond the proceedings necessary for the birth. Loud conversation, penetrating noises, the coming and going of relatives, in short everything that sets the patient's senses to work is carefully avoided.

"How greatly just these stimulations which act upon the sense organs can interfere is shown by the observation

we have often made that patients have apperceived nothing of the birth except the crying of the newly born infant, and that it is from this alone that they infer that the birth has taken place. We have, therefore, made it a custom to convey the child as soon as possible out of hearing of the mother, and if necessary to smother its cries still sooner by laying a cloth over it. More recently we have reduced stimulation of the sense of hearing with considerable success by the use of antiphones, or balls of cotton wool dipped in oil and put into the ears.

"The sudden turning on of the electric arc lamps in our obstetric operating room has often just as great a disturbing effect. The sudden stimulation of the eye impresses itself only too easily on a patient lying in Dämmerschlaf as a persisting memory, and is often the cause of inopportune awakening. Protection of the eyes from such stimulation or, if necessary, a reduction of it by dark coloured cloth or coloured spectacles facilitates the maintenance of an uninterrupted artificial Dämmerschlaf.

"The muscular sensation and the sense of balance have often made permanent impressions which as regards time lay in the sphere of the Dämmerschlaf. The feeling of being lifted, of the transportation, has often remained as an isolated recollection. Several women can also remember a feeling that they 'had suddenly become so empty,' or that something had suddenly come out of them. They do not generally arrive at the conclusion that this sensation was due to the birth of the child or of the placenta until afterward, if at all. At the time when we made extensive use of the application of the hanging position a series of patients could clearly remember that they had

lain in a position in which the head had been downward and in which they had the feeling all the time of slipping down an inclined plane.

"The organs of touch and of perception of pain showed themselves, as indeed lay in the nature of the case, least sensitive to stimulus. Bodily pain was with relative difficulty apperceived by women in Dämmerschlaf. The first of the pains due to the birthpangs to disappear from the consciousness are the feelings due to the contractions of the uterus, whilst those due to compression and dilatation of the soft parts are perceived for some time afterward."

But the memory test whether applied directly or indirectly is the essential; by this the method stands or falls.

"The power of the memory is, and remains," says Gauss, "the only guide. If we consult the memory, and test it in strict accordance with the rules laid down, then the Twilight Sleep is devoid of danger, as is shown by our statistics, and is a great boon, as is proved by the gratitude of our patients."

Not a set interval of time but relevant response to the memory tests shows that a new dose is needed. So too no set doses are given but the minimum dose that will put the individual patient into a state of amnesia. The initial dose, which is given to women having their first child when pains are five minutes apart, to mothers of many at the beginning of labour, ranges from 1/150 to 1/130 of a grain of scopolamin, seldom more. With the first dose alone one-quarter of a grain of morphin is used. Succeeding doses of scopolamin are much smaller than the first. So wide is the range of sensitiveness, as shown by the

memory test, that the periods between doses vary by as much as from one and a half to four hours.

To prevent the sleep from being broken into by appeals to the senses Gauss provided as far as possible seclusion for each patient behind padded doors and under the dim light of a twilight lamp. How important this seclusion is is shown by the fact that in the free wards where conditions are not ideal almost three times as many patients have an unsuccessful sleep.

With his first five hundred cases Gauss had sixty-five per cent. of complete painlessness and about thirteen per cent. of patients who for one reason or another could not be brought under the influence of the narcotic. Disturbed environment, temperamental refractoriness, and a first injection too near the end of birth were the causes. The cases in between ranged from mere pain-lessening to a condition almost as satisfactory to the mother as deep Dämmerschlaf.

Pain-lessening and a further condition in which some memory exists is described in the account we have quoted of the stages by which Gauss led his patients to perfect amnesia.

In the reports published in 1907 and 1911 deep Dämmerschlaf shows the same percentage.

Patients with a few "memory islands" but who nevertheless are satisfied with their sleep are grouped as partial Dämmerschlaf. These, with the perfect groups, make eighty per cent. of what is from the mother's point of view practical painlessness. In the first ward, where the environment is best and the doctors most skilled, ninety-five per cent. of patients have painless births.

[illegible] for him- [illegible] There were four the [illegible] the number, the [illegible]

[illegible] instruments [illegible] and [illegible]

[illegible] injuries [illegible] development."

[illegible] first case [illegible] complications.

[illegible] in my [illegible] I saw even in [illegible] inje- [illegible] their consent." [illegible] stimulated by [illegible] possible with the [illegible] some [illegible] to the hospital so late in painful and [illegible] to give the scopolamin-morphin the [illegible] In the [illegible] report only seventy [illegible] women in the hospital were given scopola- [illegible] was offered to one hundred per cent. [illegible] fear for the delicate women or the com- [illegible] did he see why Dämmerschlaf [illegible] from the normal ones.

"[illegible] of scopolamin-seminarcosis," said Gauss [illegible] America, "once said that he considered the method to be justifiable only in the case of those

ɔNNY Boy," an excellent specimen of a Dämmerschlaf baby. His , an assistant professor of the Freiburg University, uses scopolin preference to atropin in ophthalmological practice.

(a) "VOLCKER," of Freiburg, son of a University professor who has made a special study of the 50 per cent. decrease in infant mortality at the Klinik since the introduction of Dämmerschlaf. (b) "PETER" STRAUB'S father discovered a means of preserving scopolamin in solution: Peter was born under its Dämmerschlaf five years ago.

women who, by reason of the state of the general health and in particular that of the nerves, are not capable of standing the strain of child-bearing if fully conscious. If he thinks it permissible to grant the relief afforded by seminarcosis to an organism that is not completely normal, then I really cannot understand why this advantage should be withheld from strong and healthy mothers; and as a matter of fact, it is our principle in Freiburg to give every woman who does not object to it the advantages of seminarcosis during labour, and we have never had any reason or occasion to depart from this principle."

Gauss dwells in his 1906 report on painlessness as an aid to birth:

"The fact that there is absolutely no memory of the exertions which towards the end of the birth become more and more frequent and intense, does away with that condition of mental exhaustion that we so frequently observe in protracted births. By this I mean a condition in which birth-pains occur, but the patient in consequence of her mental and physical exhaustion is not in a condition to take effective advantage of them by active co-operation.

"It is obvious that sensitive and nervous individuals are most liable to this undesirable interference with the progress of birth which is so often observed and is known as secondary insufficiency of birth-pains.

"It is precisely in the case of patients who are already in a highly excited condition when they come to be treated, and especially in the case of those who have previously had to endure fruitless attempts to deliver them, that the effect of the injections is so beneficial that under such

circumstances I should be sorry to have to do without them.

"I believe I am entitled to ascribe yet another quite special advantage to the amnesia obtained by means of scopolamin-morphium Dämmerschlaf. It is well known how seriously the nervous system of a woman is or may be affected by a difficult birth which demands the exertion of the last remnant of her mental and bodily strength, and that such a birth, if a corresponding tendency already exists, might possibly give rise to more or less severe nervous exhaustion in which the memory of the terrors of childbearing, and the fear of a repetition of them may reduce the woman's capacity for work and embitter her whole life. The army of suffering women who, although they exhibit no signs of definite disease of the organs of generation, yet consult the gynecologist because they attribute the general nervous complaints caused by the memories of childbearing to this region, shows emphatically how extremely injurious to the nervous system a birth may be in an organism disposed to nervous weakness.

"Now there can be no possible doubt that birth loses the character of an injurious trauma to the same extent as the physical suffering and the mentally injurious impressions are reduced or even completely abolished.

"It is, therefore, not only easily conceivable but even very likely that a woman with a predisposition to nervous troubles—nervous attacks caused by overexertion, neurasthenia, hysteria, etc.—might be spared the undesirable sequelæ of childbirth to which she might otherwise easily have fallen a victim, merely by blotting out her recollection of it.

"Although considerations of this kind are of the nature of theories, which it is difficult to rigidly prove, yet one is certainly to some extent justified in drawing conclusions from the degree of exhaustion exhibited by the patient on leaving the delivery room as to how far she has been tried by the birth. How many women feel the effects for days, and cannot get rid of the exhaustion and lassitude which remain. It is perhaps due to the avoidance of this state of exhaustion that the women delivered under the influence of scopolamin-morphium almost always pass the very first night after the birth in a deep and refreshing sleep which many a woman delivered in the ordinary manner cannot obtain although greatly in need of it.

"The statement so often made to me that a patient had never been so comfortable after a birth, the repeatedly made observation that the women in consequence of their loss of memory believed that they had been in labour for only about a third of the real time—these two facts can only confirm me in the belief that in the scopolamin-morphium Dämmerschlaf we have an efficacious means of doing away with the nervous sequelæ of childbirth."

The voluntary extension of the blessings of painlessness to so many more patients than at first enjoyed them is an indication that Gauss was satisfied that scopolamin-morphin in Dämmerschlaf was safe.

His study of all details of these births, each of which was taken up by an assistant shows:

"(1) That duration of birth is normal as compared with the averages collected from the statistics of a dozen obstetricians of universal reputation.

"(2) That the birth 'pains,' or muscular contractions,

which can be observed by the sensitive hand of the doctor, and measured, and recorded on the chart by curves, are not impaired.

"(3) That blood loss is no more than the physiological loss incidental to all normal births.

"(4) That there is no injury to the child during or after birth."

The duration of the Dämmerschlaf birth was not longer than the average recognised by all obstetricians. How much this means in the shortening of those births which would in consciousness be impeded by secondary insufficiency due to inhibitory pain is brought out by the fact that some births were as a matter of fact slowed down by the narcotic to the extent of from one-half to one hour and others which, like cases of small pelvis, needed the waiting method to overcome structural difficulties were allowed to take their full time without operative interference.

In the early cases the forceps was used occasionally in cases where the birth was slowed. On the other hand the forceps as a reliever of pain was entirely cut out. And with the second group of five hundred cases the physicians felt less nervous about a slight slowing down especially as the percentage of slowing was lowered with the perfecting of the dose. The use of the forceps had been cut in half in the 1907 report. At present it is used in a little over six per cent. of all cases, a low average. And this percentage includes cases where it is used in demonstration cases for teaching purposes.

No other form of operation, great or small, was necessitated by Dämmerschlaf.

Up to very recently Gauss has been forced, in addition to observing the difficult technique, to watch his drug very closely, for scopolamin had serious chemical characteristics which made it readily deteriorate. He early discarded the inferior drug hyoscin and gave infinite pains to properly guarding the stability of the scopolamin. Recently Professor Straub of the Pharmacological Department of the University of Baden has prepared a stable form of scopolamin, and this side of the work of the Dämmerschlaf administration is made easier.

The patient's rapid convalescence, the rapidity with which the organs were restored to the normal, and the fact that a slightly larger percentage of mothers nursed their babies showed the positive advantages of painlessness.

Through this saving of energy, which could be given out in nourishment, the child gained also, as he did through the cutting down of the use of the forceps.

Of the effects upon the child, Prof. Gauss says:

"As the possibility of the vital functions of the newborn child being influenced by the narcotic cannot be dismissed *à priori,* I did not in my first cases make use of the injection unless I was already in a position to end the birth at once at any moment; that is, in general, never till toward the end of the initial stage. As no injurious effects of the injections on the child before delivery could be detected by the most careful observation, I soon considerably increased the duration of the Dämmerschlaf.

"The experience obtained from the births hitherto observed have absolutely convinced me of the innocuousness of Dämmerschlaf in regard to children. This confidence is best shown by the rule now invariably followed of be-

ginning the injections as soon as the pangs occur at regular intervals and are found unpleasantly painful by the patient, without any regard for the stage which the birth may have reached or the complications that may be present."

Of five hundred children born alive, three hundred and sixteen were brisk and lively. One hundred and nineteen showed a condition of intoxication which presents the following appearance, as described in 1906:

"The newly born infant takes one deep breath at the moment of birth with a more or less loud cry, and then lies sometimes motionless and sometimes moving its limbs, the heart's action continuing.

"It is only now and then that a short breath is taken, so that between them the appearance of recurring cyanosis is presented in consequence of the accumulation of carbonic acid gas and the lack of oxygen in the body. At the same time it opens its eyelids but then immediately allows them to close again slowly as if tired. The diameter of the pupils is meanwhile so extremely various that no inference can be drawn as to the intensity of the narcotic action. In the majority of cases the diameter was equal to or greater than the average.

"The following symptoms are also especially characteristic of this intoxication-like condition: The children respond vigorously to stimuli, but the reflex muscular actions so occasioned are often quite suddenly interrupted before they are complete, as if the carrying-out of the intended movement had been all at once forgotten. The action of the heart meanwhile is clearly dependent on the nature of the breathing. As the interval from the last breath

increases, the infant's pulse slows down gradually to about sixty beats, rising immediately again to the normal frequency as soon as the next breath is taken. This process is continually repeated at continually diminishing intervals until the breathing either spontaneously or in consequence of external causes, becomes regular. From the moment at which regular breathing begins, the children no longer show any deviation from the normal.

"In my earlier cases this condition inspired me with great uneasiness, and I consequently considered myself bound to immediately commence measures for resuscitation.

"Gradually, however, by cautiously delaying my intervention, in suitable cases, I found that this anxiety was exaggerated, so that at various times for the sake of experiment I calmly waited to see whether the child would begin to breathe properly without any outside intervention. Various infants treated in this way for over fifteen or twenty minutes established regular breathing without assistance, the breathing action becoming more and more frequent, and finally absolutely regular. If the question is asked whether children born in this condition of intoxication would get over their apnea or oligopnea even without medical assistance we can answer yes with that degree of probability which we in medicine have a right to expect."

A visiting doctor who observed this small group of sleepy births under Twilight Sleep for himself writes:

"This group of children are born rosy and fresh. The heart beats somewhat slowly, and the child breathes very superficially. Once in a while it opens its eyes. Its ap-

pearance does not create any anxiety in the spectator, and perhaps a minute or two afterward normal breathing sets in."

Asphyxia, which is the most serious breathing difficulty at birth, does not occur as a result of scopolamin-morphin, and the percentage of these rare cases where it has occurred, due to various other causes, is the same as it was in the Frauenklinik before the introduction of Twilight Sleep.

The ideal birth condition of the infant is described by Gauss as brisk and lusty, and though he soon discovered that the drowsiness referred to above was entirely without danger to the child, he set himself to avoiding it by reducing to a minimum the amount of morphin used in the earlier stages of the mother's sleep, and reducing the amount of the combined drug to the least possible proportions compatible with preserving this sleep.

In this way, between his report on his first five hundred cases and the report on his first one thousand cases, published a year later, he had reduced the percentage of drowsiness from twenty-three per cent. to twelve per cent. To-day, less than a tenth of the children are born in a drowsy condition.

As the years rounded out, and the figures for infant mortality under Twilight Sleep were examined and compared with the mortality at birth for several years in the Grand Duchy of Baden, it was found that the Frauenklinik mortality was a great deal less, some years less than half, that of Baden. Thinking the hospital environment might have something to do with this, the doctors looked back over the Frauenklinik's own mortality death-

rate in the ten years before Twilight Sleep was introduced. They found that the rate for that ten years, 3.4 per cent. of all babies born, was more than twice the rate for the six years under Twilight Sleep. And this lessened death-rate for infants continues to be a characteristic of births under Twilight Sleep. It has cut the infant death-rate of the Freiburg Klinik from 3.4 per cent. to 1.3 per cent.

A partial explanation of this low death-rate was offered by Professor Aschoff, of the Department of Morbid Physiology of Freiburg University. He conjectures oligopnea to be the safeguard of the Frauenklinik baby and the possible cause of the cut in the infant death-rate.

"A fraction of infant mortality at birth," says Professor Aschoff, "has been found to be due to the infant's attempts at premature respiration, and consequent inhalation of amniotic fluids. The autopsies of babies that have died in this way have shown the bronchial passages choked with these poisonous fluids. Such premature effort at respiration, owing to a momentary interruption of the placental supply of oxygen, is not made by the scopolamin baby, through whose system an infinitesimal trace of the mother's drug has passed, to be entirely thrown off (as Dr. Holzbach's experiments show) by the child's kidneys within a couple of hours after birth."

Klotz, in a large study of the after lives of children born in long and difficult births, did not find that a breathing impediment due to the birth had any effect on the child's after-development.

Hanner, in his study of defective children in the Breslau Klinik, could find no connection between such impediments and later mental development.

No ill effects are to be feared for the child from the use of Dämmerschlaf, and we have quoted the fact that the infant mortality at birth or shortly after birth has been greatly lessened. Dr. Holzbach showed also that the infinitely minute traces of the drug are entirely thrown off by the organism within a couple of hours after birth.

The fact may also be demonstrated that the child may be said to derive certain benefits, normally, from a Twilight Sleep birth. For one thing, during the first year of life less than eleven per cent. of Frauenklinik children died in a year when the relative mortality of Baden for babies in their first year was sixteen per cent. Is it possible, for instance, that a rested, healthy mother can take better care of her child's first year? In the matter of nursing, two independent inquiries by the Frauenklinik—groups of women confined under the same conditions—showed that considerably larger proportion of those who had been confined with Twilight Sleep were able to nurse their children. One of these inquiries showed a small percentage in favour of Twilight Sleep mothers; the other showed that sixty-seven per cent. of the mothers who had borne their children in full consciousness nursed their children, while seventy-seven per cent. of the Twilight Sleep mothers were able to nurse their children.

Over a period of eighteen months, eighty-three per cent. of the mothers confined under Twilight Sleep were found to be nursing their children.

This may be a coincidence. These may be two coincidences: the lower death-rate and the higher percentage of nursing mothers; but they tend to show that the Twilight Sleep baby does not have any unusually hard struggle for

existence as compared with his elder brother whose mother bore him in suffering.

Gauss kept in touch with over four hundred of the Twilight Sleep babies that had been born at the Klinik. Their mothers, many of them, sent the babies' pictures from year to year, so that the Klinik has a valuable collection of later data about its early Dämmerschlaf babies. Some of these are nine-year-old girls and boys who still live in Freiburg and their mental and physical development is normal in every way.

An American obstetrician, Dr. J. O. Polak, whose report is quoted elsewhere, makes the statement that Freiburg Frauenklinik has the lowest infant and mother mortality of any clinic in Europe.

With the publication of the 1906 report, Gauss's great pioneering work was done. He had found in the state of clouded consciousness, which he called Dämmerschlaf, an ideal form of painless birth. He had delimited this condition, laid down exact rules for its safe and accurate practice. He had laid emphasis on the use of stable solutions of scopolamin, on minimising the quantity of morphin, and on the individualising of the patient. And again and again he had underlined the key to the whole method: That testing of the powers of memory which is the only guide to individual dosage.

As Drs. Harrar and McPherson say in a recent American report: "It is a phenomenon as interesting as the Twilight Sleep itself that *detailed descriptions of the technique have lain idle in the literature for six years with no one taking advantage of them.*"

In concluding his report, Gauss says simply:

"I herewith condense the result of my work as follows:

"The Dämmerschlaf produced by scopolamin-morphium is able to limit the suffering of the woman in labour to the lowest minimum imaginable.

"This object is attained:

Without disagreeable secondary effects upon the subjective condition of the woman in labour.

Without substantial interference with the labour itself.

Without danger to the mother.

Without injury to the child.

"The scopolamin-morphium Dämmerschlaf renders possible a truly humane execution of the didactic duties of the institutes of learning without tormenting interference with the woman in labour.

"The scopolamin-morphium Dämmerschlaf during birth, therefore, is a method till now unparalleled, and proves to be a blessing to the doctor and the patient, to the clinical instructor and the disciple."

Such is the record of the scopolamin-morphin Dämmerschlaf as worked out at Freiburg. It has proved itself to have no elements of harm to mother or child, and has furnished in eighty per cent. of a large number of cases complete pain obliteration.

The Freiburg Dämmerschlaf is, as one American professor has expressed it, the eighty per cent. perfect method —eighty per cent. perfect as to both pain-obliteration and practicability, because it requires special conditions for its success.

This professor expressed his hope that a one hundred per cent. method would in time be worked out, one that

would always succeed and one that could be used by all doctors in all places. Perhaps such a method is even now being worked out somewhere, or perhaps the scopolamin Dämmerschlaf will set other doctors to working toward it.

In the meantime, and since popular agitation for it has lifted the technique of Twilight Sleep out of the oblivion of obstetrical literature in which it lay with no one taking advantage of it, it may be instructive to the lay-woman to learn how another great obstetrician, Sir James Young Simpson, tried in 1847 to give painless childbirth to the world, and how his method was killed.

seen fit—and most wisely we cannot doubt—to allot to natural labour, and in this feeling I heartily and entirely concur." Above the words "ether," "midwifery," etc., Simpson marked alternative readings. "I do not believe that any one in Dublin has as yet used a carriage in locomotion; the feeling is very strong against its use in ordinary progression, and merely to avert the ordinary amount of fatigue which the Almighty has seen fit—and most wisely we cannot doubt—to allot to natural walking, and in this feeling I heartily and entirely concur."

The first living child which Sir James brought into the world painlessly was in a case complicated by a pelvis so narrow that a first child had been sacrificed by craniotomy. With pain removed Simpson could use the waiting method now so much followed in cases of that sort, and in the end the mother bore spontaneously a living child. She woke saying: "She had enjoyed a very comfortable sleep and indeed required it, as she was so tired. But she would now be more able for the work that was before her." Presently she remarked that she "was afraid the sleep had stopped her pains." Like many a Freiburg Dämmerschlaf mother to-day, she would not believe it to be her own living baby that was handed her.

In after years this baby's picture, grown-up as she appears here, was shown by Simpson's son to a friend, who, "as he remarked the mild angelic air that rested upon the upturned face above the folded hands, said that it might stand for a picture of Anæsthesia, and it was a pity that the girl had not been called by that name."

If Miss Anæsthesia's picture were hanging to-day in the National Portrait Gallery possibly more women would

know of the boon of painless childbirth which Simpson in 1846, like Krönig and Gauss in 1914, aimed to give all women.

Simpson went steadily on in his experimentation, expressing more and more satisfaction with obstetric semi-anæsthesia, and maintaining the condition in his confinements from six to fourteen hours.

His object was analgesia, a semi-consciousness that should be painless; not the more subtle but easier to regulate amnesia, or forgetfulness of pain, which is the Dämmerschlaf. To prevent analgesia from passing into complete unconsciousness, under which labour can seldom be maintained indefinitely, required drop by drop watching. But this was not too much trouble for a humanitarian obstetrician to take.

Chloroform came to be his favourite anæsthetic because of its superior convenience to administer and pleasantness to take, and after the confinement of Queen Victoria in 1853 his small intermittent dosage came to be called *chloroform à la reine*. Some of his confinements read word for word like those under Dämmerschlaf.

In his first and subsequent reports on his results he stated positively that obstetrical anæsthesia could be administered without injury to mother or child.

More particularly he says of its effect that more or less perfect immunity from pain was obtained, depending on the reaction of the individual patient, her temperamental response or "refractoriness." His first case shows the high degree of success he sometimes attained.

Of the birth process itself he found that the birth contractions were not diminished, ether indeed often

acted as a diffused stimulant and tended to regularise them. The doing away with inhibitory pain also made the mother more able to exert her voluntary muscular "labour" and, on the other hand, she did not make the spasmodic efforts by which a woman sometimes injures herself in the agonies of the end of a birth.

Of Simpson's conclusions, Dr. A. Ballantyne, one of his successors as president of the Edinburgh Obstetrical Society, and himself an enthusiast for obstetrical anæsthesia, said in 1897:

"In exactly three weeks from his first case, he gave the results of his observations, which in all essential particulars have been fully sustained during the past fifty years."

This statement we believe to be borne out by subsequent experience, though this experience has been scattered, unstandardised, and never intensively studied on a large scale, as has the experience in Dämmerschlaf at the Freiburg Frauenklinik. Indeed we believe Simpson to have had a better method of semi-anæsthesia and better results than many of those later obstetricians who sometimes availed themselves of his discovery.

If obstetrics is still, as one obstetrician calls it, the "most traditional" of the sciences, the administration of chloroform in obstetric dosage is the most traditional of emergency anæsthetisation. Its use is so unstandardised that it is impossible to generalise on its effect; each user is a law unto himself, and judges its effects by his own results.

Of the few women of the last generation who did happen to know that they could with safety choose a painless

birth, we remember one mother of ten whose last baby was born under chloroform *à la reine.*

"Most of those who had this anæsthetic," says Simpson, "subsequently set out like zealous missionaries to persuade other friends to avail themselves of relief in their hour of trial and travail." This woman was no exception. She treasured the memory of this "perpetual blessing to women" until one of her girls grew up and married. Then came her chance to act the zealous missionary. Her daughter was to have a child, and the doctor shrugged his shoulders when she demanded chloroform *à la reine.* So she gave it herself, and her daughter had as painless a spontaneous birth as an unexperienced administrator could give.

The layman is almost dumb with amazement, in going over the experience with chloroform, to see how frequently it is administered by an amateur anæsthetist. One of the writers of this article has been called upon to administer it for an obstetrician whose nurse was busy waiting on him and who had not his assistant at hand.

A. Lapthorne Smith, in an address before the American Gynecological Society in 1911, advises alcohol-ether-chloroform mixture and says that the patient can give it to herself, or the trained nurse can give it; while J. W. Allwright says: "She (the patient) graduates, so to speak, the supply exactly to the demand, and in this way is presented to the observation of the practitioner one of the most important and interesting agencies in operation for relieving suffering, sometimes agony, which he ever noticed."

Though for reasons connected with her condition, *i.e.,*

increased blood pressure during pregnancy, and strong expiration and abdominal muscular action during labour —the dangers of chloroform are reduced to a minimum in the case of a parturient woman, its administration by an inexperienced layman can hardly be without dangers. But the actual administration of ether or chloroform *à la reine* throughout the last two generations, has ranged from cases like that of the mother who administered it to her daughter, and the writer who administered it to her sister, to the maintaining of as delicate a condition as the Dämmerschlaf itself over a long period of time. The longest records are twenty-eight or thirty hours.

Thus Havelock Ellis, the psychologist, uses as an illustration of dream phenomena, in his recent book, *The World of Dreams,* a Dämmerschlaf produced by very careful administration of chloroform *à la reine.*

This was a long and difficult first confinement. During the first stages alcohol-ether-chloroform (the "A.E.C. mixture") was given; later chloroform alone.

"The drug," he says, "was not given to the point of causing complete abolition of mental activity, and the patient talked, occasionally sang, throughout; referring to various events in her life from childhood onward. The sensation and expression of pain were not altogether abolished, for slight cries and remarks about discomfort and constraint imposed upon her were sometimes mingled in the same sentences with quite irrelevant remarks concerning, for instance, trivial details of housekeeping. Confusions of incompatible ideas also took place as during ordinary dreaming. 'Where is the three-cornered nurse,' she thus asked, 'who does not mind what she does?'

There was also the abnormal suggestibility of dream consciousness. The questions of bystanders were answered, but always with a tendency to agree with everything that was said; this tendency even displaying itself with a certain ingenuity as when, in reply to the random inquiry: 'Were you drunk or sleeping last night?' she answered with some hesitation: 'A little of both, I think.' To the casual observer it might seem that there was a state of full consciousness on the basis of which a partial delirium had established itself. Yet on recovery from the drug there was no recollection of anything whatsoever that had taken place during its administration, and no sense of the lapse of time."

This case was one of many in his experience.

Here is a condition surprisingly like Dämmerschlaf; not pain but the memory of pain is abolished, and the condition is checked and held in poise by observing the patient's irrelevant talk, that "Memory Test," which is regarded as the main objective aid in the maintenance of the Dämmerschlaf.

Dr. R. C. Buist of the Dundee Royal Infirmary, writing in 1907, indeed deliberately likens the Dämmerschlaf condition, though not the method of attaining it, to obstetric anæsthesia under chloroform *à la reine* as he knows it. This condition of clouded consciousness is sometimes called chloroform inebriation.

"Under this," he says, "the patient lies quietly in the intervals between her pains, wakes up" (or seems as objectively observed to wake up) "when they come on, and if she feels them, has no suffering, or if she has, is so little impressed by it that she immediately forgets it."

One doctor writes as follows of present-day procedures:

"As regards the common English method of using chloroform: one puts a little chloroform on a handkerchief in a tumbler and holds it to the patient's face, adding a little more chloroform from time to time as soon as signs of pain or discomfort appear. This proceeding seems to involve no special skill and is free from danger, whilst it is found quite satisfactory. When recollection of pain is left behind, it is probable that too little chloroform has been given. I use it in almost all my cases."

The men quoted themselves use an analgesia such as Simpson attained, and some of them use it, as the last quotation shows, very frequently. This analgesia is accompanied by loss of memory of the birth. Only in Ellis' experience, however, is a rambling conversation in which occurs confusion of incompatible ideas (the characteristic sign of Dämmerschlaf) noted.

In long confinements many skilled and conscientious anæsthetists are afraid of the cumulative effect of too steady administration, which they fear will stop or retard labour. They, therefore, often merely aim at pain-lessening (hypalgesia). Dr. J. P. Reynolds, of Boston, an enthusiast for ether-seminarcosis expressly states that he never gives his patient as much relief as she begs for. Inhalation seminarcosis, though a blessing compared with painful labour, is described by him and many other doctors in objective terms which sound anything but ideal. It is often described by the mothers themselves as a long nightmare; they remember some pain, though not in the intensity of full consciousness; the subjective experiences they remember distinctly; as one mother said in describing this

state: "There *may* not have been so much pain. But the sense of helplessness that I had, seemed worse than full consciousness and ability to fight for myself."

This is very different from the wiping of the whole incident of birth-giving out of a woman's life which characterises the Dämmerschlaf condition or perfect chloroform inebriation.

This hypalgesia has nevertheless been thought as good in obstetrical practice as analgesia. So little is the knowledge of the possibilities of obstetrical anæsthesia published and made the common property of all practitioners that their attitude runs from that of Ellis' resourceful and fearless administration over a long period, to the timidity of one authority who puts himself on record in these words: "As to chloroform *à la reine,* I do not know any one who would use it over a long period, but it is very useful where the distress begins within a short period of the probable delivery. We are now much more sensitive as to the danger of prolonged chloroformisation even when light."

It is more than possible that some of the failures of chloroform *à la reine* are due to the fact that its use has never been thought of enough importance for its possibilities to be worked out intensively on a large scale, and its practice standardised and popularised. Unpathological pain in childbirth has been accepted philosophically by the profession at large, so that each man whose personal sensitiveness has led him to use semi-anæsthesia in his obstetrical practice has had to learn its technique for himself by his own experience. If there existed as a matter of common knowledge in medicine, a technique that relieved

him of the assuming of too great risks, the average obstetrician might avail himself of it and the average success obtained with chloroform *à la reine* might produce the condition of analgesia throughout the whole of a long, tedious birth such as Ellis describes.

Simpson's attitude toward opponents of obstetrical anæsthesia was uncompromising.

"From a moral point of view," says he, "the refusal to relieve a woman in childbed of its sufferings seems to me to be a painful and terrible responsibility for a man who exercises so sacred a profession as that of medicine."

The Royal Medical and Chirurgical Society put itself on record in 1864, when some 30,000 painless births were known, as believing obstetrical anæsthesia to be a safe and desirable procedure, if administered with the care expected of an obstetrician.

Nevertheless five years later the obstetrical anæsthetist was evidently still *persona non grata,* for A. Ernest Sanson apologised with some bitterness for having the temerity to urge artificial relief in childbirth. He begs the patience of the obstetricians to whom he is speaking for introducing an unpopular subject, but calls their attention to their enthusiasm for surgical anæsthesia for the relief of pain, "which has its great exemplum in parturition."

The long thin line of men who have continued Sanson's fight for universal painless birth have not been able to conquer the ranks of conservative obstetrics. From time to time in obstetrical congresses or in the pages of obstetrical journals, these men are heard from. They are almost invariably prominent men. Newell and Reynolds of Har-

vard, and Davis of Pennsylvania, go so far as to say that if a sensitive patient cannot be narcotised, it is better that she should be *delivered by Cæsarean section than that she should endure the agony and subsequent breakdown of birth in consciousness.* Often the discussion is offered in the president's introductory address at an obstetrical congress. The wider use of obstetrical anæsthesia is invariably urged with great warmth; the assertion is made that the choice of painlessness should be offered to every woman in childbed, and that this offer should be made without any deterrent suggestion that "it may stop labour." Those who urge it believe that every obstetrician, and every general practitioner who undertakes to attend confinements should be equipped to administer it, not as an interference but as an aid to spontaneous birth.

Dr. J. W. Allwright says: "The necessity or advisability of chloroform to facilitate labour should depend on the obstetrician; as a means of relieving pain it should depend on the patient."

"Would that word of mine," says Dr. J. P. Reynolds in an address delivered at the National Jubilee of Anæsthesia but not published in the proceedings, "could convey the inestimable blessing of ether in all labour, and silence groundless excuses for its neglect. . . . 'Bless God for ether!' has burst from the lips of thousands of women. It might well be made the cry of countless thousands more."

"Men declare that it wastes time," he says in another place, "but the time of the obstetric attendant is no longer his own; he may not condemn the extra half-hour that ether will now and again compel. His disapproval is of

anæsthesia. For those two generations the right of women to painless childbirth has been withheld from them; but it is only at this late date that the rebellion of which Simpson speaks has begun.

But, delayed as it has been, the women's demand has come contemporaneously with the perfecting of that better narcotic, easier, safer, and pleasanter to take, to whose discovery Simpson constantly and hopefully looked forward.

CHAPTER VI

"Time Will Tell": Berlin to Chicago

"Dämmerschlaf in obstetrics," says Gauss in 1911, as though laughing at his critics, "has one quality in common with other methods, namely, that it was enthusiastically welcomed by some, opposed and rejected with equal energy by others. We have now," he goes on, inviting a reopening of a battle whose last skirmish had been fought in 1907, "reached a new stage. We have statistics of over eight thousand births, of which three thousand were in the Freiburg Frauenklinik. These three thousand," says he, rubbing the challenge in, "furnish homogeneous statistical material to serve as a touchstone for the value of the methods used elsewhere."

But the struggle to improve the standard of obstetric use which he began in Germany was not to be reopened till 1914; this time in America.

Germany, the birthplace of obstetrical scopolamin-morphin, had heard enough about the subject, so she let the discussion drop. She was satisfied to let each physician use or not use that "dangerous drug scopolamin" according to his own individual decision and according to his own individual method.

This is what England, the birthplace of chloroform and ether, had done with the efforts of Simpson and his follow-

ers who urged wider and better knowledge of these narcotics in childbirth.

Contrary to the statements of many doctors, scopolamin-morphin in childbirth has never been discredited or discarded.

Germany, counting in the large total at Freiburg, must have to-day some twelve thousand scopolamin-morphin births, eight thousand of them under Freiburg technique, largely as a result of the publicity of the great medical quarrel—Berlin University against Freiburg University—of 1907. Every year many hundreds are added.

After 1903 von Steinbüchel's obstetric use of scopolamin-morphin had spread quickly. There was a wildfire of experimentation. His twenty cases were assumed to have proved the perfect safety and the perfect efficacy of the obstetric narcotic. Later on after a series of mishaps, the evidence of Gauss's thousand cases could not convince many that there was any method by which it could be safely and efficaciously used.

Those who followed Steinbüchel's caution had encouraging results. But many were not cautious; they used little skill and few precautions and had many accidents great or small. Scopolamin-morphin fell as quickly out of favour as it had come in; its record in major surgery was recalled and another cross put down against the drug.

But its intrinsic merits were such that it could not be killed in either surgery or obstetrics.

The combined narcotic, scopolamin-morphin, is a new one. Its first use goes back no farther than this century. Its history belongs largely to Germany.

Casting around for some general anæsthetic which

should not have the steady death-rate of chloroform and ether, a group of German surgeons, among them Korff and Schneiderlin, of Freiburg, believed that in this they had found the ideal.

These doctors used the combination hypodermically in huge dosage for major surgical operations, and had several deaths.

They had overdosed, believing for reasons they set down in long contrasting columns, that the two drugs were perfect antidotes in their action on heart and respiration and in other respects.

When the disillusionment came with the accidents scopolamin was held to be responsible, though the evidence turns out to be strongly against morphin.

It is recognised now that there was a grain of truth in the ingeniously worked out theory of antidotes. Scopolamin to some extent antagonises the depressing action of morphin on the breathing centres.

To-day the use of the combination in major operations is abandoned, but it is found invaluable in small dosage as a preliminary narcotic to save the patient's terror and struggle in going under ether or chloroform. It is used in this way by all anæsthetists everywhere. In Crile's anoci-association by combining this drug with other elements in his method, the inhalation narcotic can sometimes be eliminated entirely.

These are the surgical uses of scopolamin-morphin, or scopomorphin. To be efficacious in obstetrics and obliterate pain without interference with labour it has to be used in a succession of infinitely small doses so far apart

that any danger it may offer in surgery to circulation or respiration is reduced to a minimum.

For all uses of this new and experimental drug during the last ten years the death-rate per thousand cases stands midway between the two old-established and well-known anæsthetics, chloroform and ether. When the ether death-rate is corrected by deaths from ether pneumonia, scopolamin-morphin stands lowest of the three.

It is, however, with its use and its mortality in obstetrics that we are concerned.

Among those who were not frightened away by others' accidents were, as we know, Krönig and Gauss. Instead they cautiously perfected their own use and, in 1906, not until he had a larger experience than any one who had yet reported, Gauss published his thorough study of five hundred cases. Its effect was to reopen a subject that was losing its interest. It reopened experimentation also.

We now recognise that it laid down definite principles which made further reckless experimentation unnecessary, but many of its early readers did not care to see that point. Some did, however, and in 1911 a student collected the experiences of six men who had published reports on some twelve hundred births conducted under the conditions laid down by Gauss. These men express enthusiasm; and there were many other followers of Gauss besides those recorded in that group.

But there were many others who did not attempt to follow Gauss.

Gauss's first dose of .0003 to .00045 scopolamin and .01 morphin was followed by a diminishing dose of scopolamin widely and irregularly spaced in accordance with the

SIR JAMES YOUNG SIMPSON'S sole and persistent work was with obstetrical semi-anæsthesia, or the attaining of painless spontaneous birth. "My profession may never help me," he said once, "but women themselves will betimes rebel against the usual tortures and [illegible] of childbirth."

THE FIRST "PAINLESS" CHILD. By chloroform *à la reine* Sir James Young Simpson maintained a Dämmerschlaf condition from six to fourteen hours.

memory test, morphin generally dropping out after the first injection.

The dosage of those who saw no more in Gauss's 1906 report than that it was favourable to scopolamin-morphin and that it covered as many as five hundred cases, ranged from .0001 to .002 scopolamin, from .01 to .02 morphin for the first dose; successive doses not infrequently repeating the morphin and being spaced either at set intervals or as the doctor saw objective signs of pain. They made no use whatever of the memory test.

Overdosing was heavy under these conditions. The student above referred to finds over twenty of this class of report covering not quite two thousand cases, and Gauss refers to others.

They show frequent and excessive prolongation of labour resulting sometimes in asphyxia of the child. There is much oligopnea also. In some cases there was stoppage of labour. In others there were reported hemorrhages, calls for the forceps to end the birth quickly, and other disagreeable results. In all this experience and in the earlier obstetrical experience with scopomorphin, however, in Germany, the country of careful death records, there is no record of a mother killed. Six children dead were charged to scopolamin-morphin but reference to their autopsies shows in all but one, amply sufficient cause for death without holding the narcotic to blame. That one (Dr. Bass's case) showed symptoms of morphin poisoning.

It is strange, or perhaps it is in reality a tribute to the safety of "that dangerous drug scopolamin," that reckless experimentation had no more victims than this.

[illegible] will show that the light is to be thrown [illegible] for the [illegible] and for the right use of the drug.

[illegible] when Berlin University placed [illegible] Freiburg.

[illegible] to find the mechanistic side of [illegible]. It is enough to quote the [illegible] Freiburg will find is that the reason [illegible] for the appeal [illegible] among society [illegible] the policy of the Berlin Medical School. [illegible] it would now be [illegible] Germany."

[illegible] this as a piece of local gossip to [illegible] Dr. Hocheisen who was sent by the great [illegible] of Berlin to study [illegible] spent [illegible] out of his limited two months' study in the [illegible] in the wards of Freiburg at the [illegible]. That may be the gossip we need to repeat. [illegible] Hocheisen did not jump down in the [illegible] to get a real concept for a [illegible] relieving the mother's pain that was a "torture [illegible]."

[illegible] by his experience he returned to Berlin Klinik [illegible]. Soon he had one hundred cases to [illegible], and at the next meeting of German gynecolo[illegible] the two universities clashed. Gauss now had one [illegible] cases. His tables showed the dosage more perfectly adapted to the individual needs of the mother and child. The percentage of oligopnea, for one important thing, was cut in half. In no respect had the method fallen behind; in most respects it had improved.

With his hundred Hocheisen expressed disappointment.

He paved the way for disappointment in his preliminary statement, by his melancholy account of the drug he used. It is strange, he says, "to hear praised a poison so incalculable in its effects. It is used by alienists," he continues, showing that one effect is evidently calculable "to replace the obsolete strait-jacket." And so he goes on painting luridly the worst the drug can do. As Gauss says of another critic, this was no hospitable spirit in which to undertake work that needed sympathy and adaptability for success.

Passing on to his cases Hocheisen says that though the majority were successful in some alleviation of pain many bad effects were observed, labour was frequently unduly prolonged, forceps had to be used in a large percentage of cases and could, he generalises, have been used in a great many more. Postpartum hemorrhage was frequent and so were deeply apneic babies.

Gauss's directions were, he assures us, followed in every particular—except for the minor detail, that his entire technique had to be abandoned as hairsplitting and complicated and that the conditions of a large charity hospital made it impossible to adapt the environment properly.

Inquiry into his dosage shows that in other particulars also Hocheisen deviated from Gauss, using for the most part but one dose; this one dose was in many cases very large, going as high as .0009 of scopolamin and even occasionally .002. Abandoning Gauss's memory test, his criterion for success had been objective signs of painlessness; and these, as Gauss pointed out, are always signs of overdosing. Test of his preparation of scopolamin proved

that it had not, in those days when no stable preparations existed, been freshly prepared, and it had gone bad.

As Gauss's analysis of Hocheisen's report brought out one after another of these defects and deviations from the model, Hocheisen was driven from sober exposition to irritated generalisations. He ended with an angry look into the future.

"We shall probably never agree," said he. "The future will show who is right. If scopolamin remains Gauss will be right. If it disappears I shall be right. Time will tell."

With these historic words he ended the famous debate of 1907. He had set up a man of straw as Gauss's method, and had knocked his man of straw down. But fortunately the real man had been present to point out the fraud.

Harm was done, probably more harm abroad than at home, because many of those who had heard the debate learned from it the real technique. To-day there are scattered throughout Germany hospitals using the Freiburg method with a total of many thousand cases. The head of one of these hospitals says in defiance of Berlin:

"We have here a means, if the physician does not grudge the time, which without appreciable loss in vigour of pains, without danger to mother, or injury to child, enables us either to completely abolish apperception of pain in confinement, or to reduce it to a minimum."

But the main great clinics tried their experiments in Freiburg technique in the manner of Berlin, and with like results. Steffen, of Dresden, who enjoyed a woman's pain, entered upon it in that spirit, carried it out in a crowded clinic with complete disregard of amount and very per-

functory following of the method of the Freiburg dosage.

This Steffen was a sensitive man. His report is dominated by his nervous concern for the unpleasant impressions a painless birth may make on his interns and midwives. He deeply grieves for his head midwife, who tells him frankly that after fifteen years of midwifing, all this nonsense of women half under an anæsthetic, some excited and requiring constant watching, all irrelevant in their talk and indifferent to their surroundings, is highly "unsympathetic" to her.

He did not trouble his interns much with the memory test, and he did not protect the patients' senses from disturbance by blue glasses or antiphones "out of consideration for the assistants, because of the repulsiveness of the picture presented."

The other main critics, Gminder and Avarffy, in every respect patterned not on Gauss but on Hocheisen. They went even further, for they repeated the full dose more often than he, including the morphin. All confessed that they undertook the experiment unwillingly, in response to popular demand. Their methods show them either determined to fail, or too stupid to understand the Freiburg technique.

Leaving it in words for time to decide, Herr Bumm, of Berlin, and his allies from the other great city clinic nevertheless believed that they had settled the matter of the value of Freiburg Dämmerschlaf for good.

The setback they gave to it was not final, but it was most important; nowhere more so than in America.

France was not much affected. She had quickly run through her own experience with scopolamin-morphin, and

most French obstetricians had discarded it. When we read that one of them used a dose four times as large as Steinbüchel's we are not surprised at some disappointments. In 1911, however, Lequeu was still recommending it.

English experimenters were few, and mostly cautious. They adhered to Steinbüchel's dose, contenting themselves with mere lessening of pain, as some physicians use chloroform and ether. Dr. Buist, of Dundee, has used it in this way in the majority of his cases since the early days and it has spread from him to many other physicians in Dundee. J. Halliday Croom was still using it and reporting his enthusiasm as late as 1909.

Neither France nor England was much affected by Gauss's work, except to quietly note and reject his difficult technique.

America was strongly affected by the discussion at Berlin.

When we expressed to an American doctor our regret that our work had caused attacks on the Freiburg doctors, he laughed. "Injured the Freiburg doctors!" he said. "You have disinterred the Freiburg method. We took our judgment of medical matters from Berlin, and Berlin opposition and misrepresentation had successfully closed the subject for us until you reopened it."

This has been our own judgment from reading the literature on both sides of the ocean.

With the early days of Steinbüchel it had been taken up over here, unstandardised and haphazard.

There had been discouragement, but when Gauss's report came in 1906 work began again. This is the work

that has come to be spoken of as the Chicago experience because in newspaper interviews several Chicago doctors have recently spoken of their adverse experience, and because of a personal incident.

Standing at the bedside of a woman just delivered in the American Hospital in Paris one of us first heard of the Chicago experience, in such a manner as to fix it in her mind under that name. She had recently come from her sister's painless confinement at Freiburg to this friend's very different experience. A weak voice came from the pillow: "It was short, thank God; it was hell while it lasted."

From a room nearby came the groans and cries of another woman in "her hour."

The visitor's nerves were overwrought by a situation which seemed to her now so harrowing and so unnecessary; she had come from the clinic known to American medical men, she found later, as the most humane in Europe.

"How can you stand this?" she asked the young doctor at the bedside. "Don't you know the scopolamin Dämmerschlaf at Freiburg?"

He glanced at her as a young doctor glances at a hysterical fool of a woman.

"Oh, that," he said. "We tried that out in Chicago years ago, and it was no good."

He waved his hand at the woman on the bed.

"She didn't have any kind of a hard time," he said. "She's all right."

It was the first of many times that we were to hear the whole Freiburg experience discounted in a phrase; so Chicago stands for much to us.

It seems to have been a matter for open discussion in Chicago at the time, for club members remember their doctor friends discussing Gauss's reports. They remember also talk of Hocheisen's report, and the Chicago doctors' growing discouragement with their own results.

Experimentation with scopolamin-morphin in childbirth was in reality countrywide; with each phase of experimentation in Germany, it spread to America. Dr. Charles M. Green, Professor of Obstetrics at Harvard, took it up after Steinbüchel. His results did not satisfy him, and he appears to have taken no part in the later work that followed Gauss's report in 1906.

How extensively Gauss's report itself was read in America it is impossible to say, but in the medical reviews there appeared short digests. Dismissing the technique with a sentence or a phrase, they brought out the fact that the Freiburg Frauenklinik had now had an experience of five hundred cases, which it reported having delivered with no injury to mother or child and with no interference with the birth process.

The figures alone impressed; experimenters looked no deeper.

They used the drug combination as though the amount or proportions were of no importance. We are told that scopolamin, of which Gauss's first injection ran, in American terms, from 1/200 to 1/130 of a grain, decreasing in later doses, was given in America sometimes in as large doses as 1/75 gr. with no decrease in the amount at the second dose. The inferior and less dependable hyoscin they used more often than scopolamin. Morphin was repeated in 1/6 to 1/4-grain doses as often as the scopol-

amin. John O. Polak, Professor of Obstetrics in Long Island Medical College, who took part in the experimentation of this period, believes that mother and child could not have failed to be heavily morphinised by such doses.

From overdosing with one or the other drug there were many accidents. Halpenny, Vrooman, Ries, C. B. Reed of Chicago, W. H. W. Knipe of New York, Barton C. Hirst of the University of Pennsylvania, and J. C. Applegate of Philadelphia were among those who reported unfavourably.

In Germany it will be remembered no mothers were lost and but one child. In America where post-mortems are in most cases lacking it is impossible on the published evidence to prove any deaths. Long ago Simpson said with bitterness that all deaths not easily accounted for would be ascribed offhand to the anæsthetic he used in childbirth. And to-day the doctors' statements range from "many mothers and children lost" from scopolaminmorphin to Dr. Applegate's conservative statement that he had "many unpleasant effects on mother and child." Dr. G. F. Butler comments on the fact that though the dosage was reckless and such as to invite disaster, it seems as if the reporters must have spoken at random of their mishaps to mothers and children. For in 1906 when he undertook to gather in records of the contemporaneous experiences, he found out of at least one thousand births only nine deaths of children reported by H. C. Wood, and no deaths of mothers. Of Wood's cases only one had a postmortem, and in this case, says Butler, "we are asked to believe that advanced fatty degeneration resulted from a single administration of the anæsthetic."

At this time Butler comments on the recklessness of the dosage prevailing among experimenters, and wonders at the lack of a proved death-rate. In 1911 Hatcher says frankly that no deaths have been proved against scopolamin-morphin in American obstetrics.

But overdosing introduced enough disagreeable elements into the births for Hocheisen's report in 1907, based as it was on the same ignorance as their own of the Freiburg technique, to be welcomed with relief in America as closing for good any attempts to make use of scopolamin-morphin in spontaneous birth. Berlin, the first medical university of Germany, had—it is true, on the slim showing of a hundred cases—settled for good and all the claims of Freiburg for scopolamin-morphin, the one thousand Freiburg cases to the contrary notwithstanding.

Doctors Polak, Knipe, and Reed and Drs. Harrar and McPherson of the Lying-in Hospital have within the last few months resumed the use of scopolamin-morphin, using true Twilight Sleep technique, and they report none of their former mishaps. The doctors at the Lying-in Hospital have already been quoted in regard to the former disregard of the Freiburg technique.

In the general abandonment of scopolamin-morphin there remained a few obstetricians who persisted in its use. They had always respected their drug, had always been cautious with it. They had used it so that it could do no harm and had found it useful. In 1911 it was still being written of in the medical journals. Among the obstetricians who persevered were Bertha von Hoosen, of Chicago, and Franklin S. Newell, of Harvard. These in their practice kept up the tradition of this drug in child-

birth. Neither used the Freiburg method, but both used judgment. When the safe Freiburg method of use was in 1914 really placed for the first time before medical and general public there were these medical men and women to vouch from their own long experience that scopolamin-morphin could be so safeguarded that it could be used in obstetrics without detriment to the mother, the child, or the birth process.

periodical literature which had survived in competition with the news of the brutalising of humanity by life-destroying war. The two things stood out strikingly against each other, one representing the hopeful future, the other the hopeless past; one representing the obedient acceptance of military authority by men, the other representing the repudiation of medical authority by women.

All over the world of medicine a few intelligent physicians have persisted in their use of scopolamin-morphin in birth since, after a period of reckless, haphazard use, it was given up by the profession in general a few years ago. Most of these have contented themselves with a cautious use that served in most cases merely to lessen pain. Few of them used it universally, in all births. We might have found Freiburg one of a hundred or more lying-in places where this cautious and partly successful use had survived. We did, as it turned out, find it the place where the science of obstetrical anæsthesia had been worked out to a perfection that set a standard for the world. We could place the Freiburg technique, a "touchstone on which all other uses of scopolamin-morphin could be tested," in the hands of the women of America.

Equipped with this standard, they persisted in their demand and by the fall the medical profession had passed from damning criticism to very extensive experimentation; much of this has been carried on, as far as published reports show, with an open mind and a conscientious following of the Freiburg technique as far as it can be learned from Gauss's published reports without residence at Freiburg. The medical journals had passed from ridicule to serious consideration.

The story of the attitude of American medicine towards the popular telling of a medical secret which rigid adherence to medical channels of publicity in Germany had almost killed is well worth telling. German women clamouring for information had got no satisfaction and the German medical press was absolute. The story in America is very different, because the women knew. It is not told in any spirit of abuse, but to show how without an informed public many good things can be bullied out of existence by professional attacks which have no weight of reason behind them.

It must be said that looking back over the whole story, after the first anger, the response of the medical profession has been in most cases the response of people whose minds are both broad and simple. But without the women the first anger following upon the indifference physicians had shown to Krönig's own testimony, would have checked the Dämmerschlaf in America as effectively as it had been checked at home.

The ground for the first attack was anger and disgust at the violation of medical ethics. Physicians did not believe that without the doctor's connivance non-professional women could intelligently gather information from published scientific sources. Discounting on these grounds of self-advertising the value of the special contribution of the Freiburg practice, there was left a real fear of this popular recommendation of powerful drugs. If they were in the mood to discount the value of the technique, the fear is understandable. It is this which in the mind of the conscientious physician puts medical reserve next in

importance to the promises and prohibitions of the Hippocratic oath.

It is difficult for an outsider to grasp the sanctity among physicians of this idea. The avoidance of general publicity in medical matters until the particular contribution has become a matter of general practice seems to us to offer more dangers than safeguards. It gives the profession a supreme power to kill or let live things of vital general interest. This has been recently pointed out in two medical journals and the campaign for Dämmerschlaf was the occasion. Medicine is full of discoveries that had to be rediscovered because they were killed by the profession. Oliver Wendell Holmes was laughed at, Semmelweis was driven insane, and a whole generation of women were deprived of the benefits of asepsis in childbirth, because there was no body of outside opinion to support these physicians in their work. Medical publicity to the outsider seems to-day to have saved another blessing in childbirth from being delayed another generation or more.

"Quite naturally," said *American Medicine* a few months later, "this publicity roused a storm of protest on the part of a medical profession accused of backwardness." Obstetricians would not believe that a popular magazine article contained facts new to them. They judged that Freiburg had a record and a practice like their own with scopolamin-morphin, and their own record had been so unsuccessful that they feared new experimentation, especially by ill-equipped general practitioners. The general practitioner who criticised, protested for other reasons. He had read the magazine article, learned the technique that the drug demanded, and knew that as the

cost of childbirth was rated by his patients he could not afford to give it.

Fear, then—fear of dangerous experimentation on the one hand, fear for the loss of his patients on the other—made the obstetrician and the family doctor combine at first to try to laugh the new medical "craze" out of existence. The first criticisms in medical journals were intemperate and often entirely irrelevant. They had no effect on the public interest, and this method of attack has not survived except in an occasional letter by the local practitioner to a provincial newspaper.

No medical journals were more intemperate in their first attacks than the New York *Medical Journal* and the Cincinnati *Lancet Clinic.*

In May the *Journal* called the Dämmerschlaf a quack scheme and the magazine writers advertising-copy writers. In the early fall it published an announcement that the Dämmerschlaf was not the peculiar proud possession of Freiburg alone, but had been used for some time in the Jewish Maternity Hospital in New York City. We can forgive the *Journal* for withholding the further fact that the method had been undertaken in this hospital early in June by a former Freiburg intern to justify the claims—made in the popular magazine—for the Freiburg technique. It is enough that by this announcement and by later publishing a report on a series of cases in this hospital the *Journal* raised the Dämmerschlaf in the estimation of its readers from a quack scheme to a recognised medical procedure. Its wholesale condemnation had given way to qualified support.

Contemporaneously with the New York *Medical Jour-*

nal, the Cincinnati *Lancet Clinic* published an attack in its correspondence columns in terms more dignified but no less sweeping. Scopomorphin had been tried and discarded in obstetrics. Editorially it has not, since then, let the subject drop. Put upon the defensive by the accumulating evidence that there was good in the Dämmerschlaf and that the early medical judgments on it had been ill-conceived and reactionary, the *Clinic* made the protective editorial statement "that the medical profession is progressive and not conservative is well known to all its members." On that progressive platform it published the next month Dr. Magnus A. Tate's report on what work had been done with Dämmerschlaf in America from June to September. Subsequently it published the report of the Lying-in Hospital in New York, and later still it published an editorial which is one of the finest of recent estimates of the place of scopolamin-morphin in surgery and obstetrics. It begins with the statement that "it is hard to understand the latter-day dread of scopolamin" and ends with the recommendation of extreme caution in the use of morphin, for "scopolamin is as safe for infants as for adults." These might almost be the words of Gauss of Freiburg. Caution in the use of morphin is one of the essentials of the Freiburg method.

Many of the early criticisms, themselves offered in the form of criticisms of Gauss, simply echoed Gauss's own criticism of unstandardised use of scopolamin-morphin. "Painless childbirth declared obsolete" is the curious newspaper headline given to a column on a criticism of this kind by the *Journal of the American Academy of Medicine* in June. The criticism emphasises like Gauss the

necessity for going slow on morphin, and dwells like Krönig himself on the necessity for a trained obstetrician and a hospital environment for safe and successful obstetrical work with scopolamin-morphin. Nevertheless it leaves, and it is designed to leave, the impression that it takes exception to Gauss and Krönig, trying to confuse their method with unsafe and unsuccessful ones.

So Barton C. Hirst, Professor of Obstetrics in the University of Pennsylvania, writing in the *Ladies' Home Journal,* tries to make the Freiburg method appear an unsuccessful makeshift adaptation of a method that had failed.

"This treatment," he says, "was used in the maternity of the University of Pennsylvania in a series of cases over a period of two years. My experience of it coincided with that of my colleagues in this and other parts of the world. If enough morphia is given to abolish pain there is danger. . . . In 1912 I had the pleasure of observing *this method* at Freiburg. . . . It was interesting to hear that the morphia was employed in a single moderate dose, followed by small quantities of scopolamin. Evidently the disadvantages of *the treatment* . . . had necessitated this modification."

Dr. Hirst further enhances this idea of the makeshift nature of the Freiburg procedure by stating that he does not believe that the successive doses of scopolamin given abolish pain, but that the patients "being told afterwards that they had no pain, left the institution impressed with that belief." In this belief that a large part of the painlessness at Freiburg is attained by working on the patient's credulity, Dr. E. Gustav Zinke appears to agree with Dr.

Hirst. Dr. Hirst would have some trouble in making a Freiburg mother believe this, after she had had one experience of waking incredulous to find her baby already born.

Criticism by ridicule and criticism by such subtle distortion and distraction of the reader's mind as this were not the only early forms.

Among the many important gynæcologists who freely expressed their adverse opinions in the general press though the press was taboo for extended favourable opinions, as one or two physicians found, most expressed themselves in wilful disregard of what was being done at Freiburg, but with a very clear memory of their own failures years ago with scopomorphin. Dr. Charles M. Green of Harvard had an experience in 1903 before the Freiburg method of Twilight Sleep was even thought of. Nevertheless, he bases his adverse criticism entirely on this early experience of his own, and he has informed himself so little on the distinctive characteristics of Twilight Sleep that he roughly calls his own use Twilight Sleep.

When asked what she thought of Freiburg Twilight Sleep, a Chicago obstetrician answered briefly: "I used scopomorphin in twenty cases some years ago and was not pleased with my results."

The peculiar empirical quality of the medical mind made it hard to divert it from personal experience. Most of the obstetricians would not at first accept the contribution of Freiburg, because they could not at first grasp the fact that Freiburg had made any contribution.

But even in the early months, lost sight of in the more spectacular headline-making criticisms, are on record the

judgment of a few obstetricians that Freiburg probably had a better method of procedure to offer than they had known.

And among those same early critics who had used scopomorphin and who felt called upon to put their disapproval on record there were not a few who changed their opinion later. Dr. Ross McPherson of the Lying-in Hospital, New York, is one of these.

"Undertaken rather in a spirit of scepticism," says Dr. McPherson, in the introduction to his report with Dr. Harrar on a series of 100 cases delivered under Dämmerschlaf between June and September, "the present investigation was begun by us several months ago. Doubtless many others have shared our recent experience in being the recipients of inquiries on account of recent sensational articles in the lay press on 'painless childbirth.' The first attitude was naturally to ridicule the whole matter as preposterous. . . ."

He reviews the unsuccessful American experiments and the dropping of the drug, but recalls to his readers' attention Krönig's re-awakening of the subject in the fall of 1913, though it fell at the time on deaf ears.

"It is scarcely possible that the distinguished head of a reputable German clinic would presume to publish successful results of a method in over 3,000 cases unless there was some virtue in it."

It needed the sensational magazine article to bring this tardy afterthought. But never mind that; it is the afterthought that is important.

"It was," Harrar and McPherson go on, "entirely with an open mind that we approached the experiment, wishing

to ascertain to our own satisfaction to just what extent we could condemn or extol the merits of the treatment."

Then they call their readers' attention to the important point we have mentioned. It is worth repeating.

"A phenomenon as interesting as the Twilight Sleep itself is that detailed descriptions of the technique which have been followed closely in this study have lain idle in the literature for six years with no one taking advantage of them. Those who did make trial of the procedure" (the narcotic, that is) "wandered far afield both in method and in the object to be obtained."

. By the time this was written, in September, there were probably few obstetricians who still criticised the Dämmerschlaf on the basis of their own past experience acquired before they knew of the Dämmerschlaf. But Drs. McPherson and Harrar are the only ones to put the mistake on record.

Aside from reports on experience, the recent statements from physicians have been either informing like Dr. Evans' article in a Chicago newspaper or carefully critical. There is more respect for the other side evidenced. Many of the statements of opponents in the Symposium in the *Medical Times* for December were warnings in regard to the great skill and care with which scopolamin-morphin has to be administered. With the accent different, as a demand that these safeguards of care and skill shall be supplied, many of these criticisms might have come from Krönig or Gauss themselves. They, like their critics, demand the hospital, the best and the most stable preparation of the drugs, the skilled and responsible and experienced obstetrician ready to meet all the emergencies of a birth.

It is no more than this that Franklin Newell of Harvard means when he states warmly that only the most skilled interns can administer scopolamin-morphin in childbirth. They consider at Freiburg that it takes two years to give an intern the general and special training which would make it possible for him to conduct a sleep unsupervised by his superior.

The obstetricians' fear of the ill-trained general practitioner has been spoken of, and with it the recognition by many general practitioners that the technique of Dämmerschlaf was beyond their power to give on their stipend. The women requiring Dämmerschlaf of their doctors know the technique and demand it. They know it so well that the idea of the hospital environment is growing more and more popular. For this very reason perhaps the general practitioner is taking his patient's demand the more seriously.

The scores of unknown doctors whose Twilight Sleep cases appear in the newspapers are not altogether in the position that the apprehensive obstetrician has in mind. When obstetricians used scopolamin-morphin some years ago they knew nothing about it. To put it freely in the hands of the general practitioner on those terms would have been alarming. But to-day the general practitioner in America and his woman patient have as guide the Freiburg technique, which reduces the dangers of scopomorphin to a minimum.

When Dr. Magnus A. Tate reported to the Cincinnati Medical Academy in 1914 on the first experiences with Dämmerschlaf births in America he did not go to Gauss's 1906 report for his description of the technique. He

quoted from the extensive descriptions in the popular magazines and these same guides against bad usage are easy of access to all doctors.

But we do not mean to underestimate this danger from the unskilled. We are doubtful whether the general practitioner, with his three confinements to his credit in his medical course, is competent to conduct confinements, whether painless or painful, with all the emergencies that they may involve. One of the most useful things that the campaign for Dämmerschlaf has done is to bring out the need for better obstetrics.

In response to this new demand, some general practitioners are raising their price for confinements and making themselves more proficient in this work. One whom we know of has taken extra study in obstetrics and is branching out as a specialist in Dämmerschlaf, a work parallel to that of the anæsthetic specialist of whom a general medical training is required.

Taken altogether, we do not believe that the general practitioner with the standard of the Dämmerschlaf before him and his patient can do more harm with scopomorphin than, if as much as, the obstetrical specialists all over the world did a few years ago when they experimented with scopolamin-morphin as a new drug.

Equally prominent with Dämmerschlaf births in the newspapers throughout the summer was the exodus of American doctors to Freiburg. It began almost as soon as the woman who went there experimentally early in June, "fleeing from the ills she knew in her previous births to take her chances with the Twilight Sleep." One of the first obstetricians to go was this woman's doctor.

His report on the Twilight work he did after his return should interest all women. This sending of the doctors is the first big thing the American women accomplished by their persistent demands on individual doctors.

"Listen," said one physician who was asked how he came to go to Freiburg. "I could not help going. I was in Berlin, and I received no less than six copies of one magazine from my patients with instructions not to show my face in America until I had been to Freiburg."

With the first public exploitation of Dämmerschlaf, many were the hints of commercialism; of the women who would migrate and pour American dollars into the modest till of the University of Baden Frauenklinik and the pockets of the two Freiburg doctors who had offered their secret freely to American doctors the year before.

But the women chose another way: they drove their doctors to the University of Baden Frauenklinik, scientific America went to Freiburg in a great migration. At one time there were fifty doctors registered in the big hotels and the persons and numbers changed all the time, so it is impossible to say what the total was. When the war came in August, a score were left behind. They were among the most efficient people on the committees who led their compatriots to the coast.

When we left a month later the Frauenklinik staff were at the war. There were no doctors at the hospital save two younger interns and one American who had been admitted earlier to follow other work but who now offered himself and was accepted as a substitute in the obstetrical division. The Red Cross ambulance flag was run up, the whole private ward floor was given over to wounded men,

and Dämmerschlaf was confined to the birth-rooms and the general ward.

Those of us who saw the doctors go, and the hospital transformed into a lazaretto, felt as if our effort to give publicity to the Dämmerschlaf work had been guided to an almost providential timeliness, and that for months if not years to come, the women of America who had been broad-minded enough to respond to our message, with a prompt enthusiasm of response that has never been equalled, must be the custodians of the great gift to womanhood that for all time must be remembered as Krönig's and Gauss's contribution to the humanisation of obstetrics.

In the early fall the American doctors had all gathered in America again and the serious work for Dämmerschlaf began. There is probably no local or national medical body in America which has not had a session or many sessions on Dämmerschlaf. The records of these sessions will not be published for many months, but we know that in only one city did the body of medical men officially disapprove the agitation for Twilight Sleep. This was the Medical Society of Milwaukee County, which condemned the whole idea in a sweeping resolution without discussion.

The women of Milwaukee were not asleep when this happened. Three days later the Women's Association of the Milwaukee Maternity Hospital put themselves on record in an emphatic resolution condemning the action of the Medical Society.

In most bodies the root-and-branch opposition was noticeable as being made by a few men who prefaced their remarks with the statement that they had personally had

no experience with Dämmerschlaf. For the rest, the meetings were mainly for information, not opposition, and brought out that broad and simple attitude of mind in which the medical profession, now that the first shock and indignation was passed, was approaching the Dämmerschlaf. In most cases the discussions were prolonged and adjourned unfinished, to be taken up a week or so later.

We find clippings of meetings at Philadelphia, Chicago, Boston, St. Paul, St. Louis (the latter representing the medical associations of three States), Cincinnati, Milwaukee, Jersey City, Cleveland, Richmond, and many other places, and of lectures in still others. They give an idea of the wide geographical distribution of intensive work with Dämmerschlaf on the part of physicians.

New York gives an idea of how many more sessions have been held than are reported in the newspapers. Only two medical meetings on this subject were reported. Yet during the last three months probably a dozen meetings have been held. The conference of the American Association for the Prevention of Infant Mortality discussed the subject. The Public Health Division of the American Academy of Medicine addressed a memorandum on it to the obstetrical division of the Academy which had discussed it at three of its monthly meetings. This memorandum is peculiarly important in the history of medicine as well as in the history of women. For the first time a national medical body has put itself on record as demanding what individual obstetricians of sensitiveness and sympathy have been demanding for two generations; what all women should have been having since the use of anæsthetics. It urges medical men to take the consideration of

Dämmerschlaf into its own hands, not leave it in the public press, for if not by this means then by some other "the pains of maternity should be abolished."

This is the underlying theme of all these meetings. The women of America have made the relief of birth pain an issue. They believe that the Dämmerschlaf is so far the most efficient and the safest method. Their belief is echoed by a doctor at the Woman's Division of the Academy of Medicine. She stated that the Freiburg Dämmerschlaf could with infinite pains to doctor and nurse be administered safely and successfully to women in labour, and that the "decision as to whether it should be used lay not with the doctor but with the women themselves."

Many and divergent are the personal views brought out at these meetings. Though these are not as important as the personal experiences with scopolamin-morphin, it is interesting to learn that a Long Island City doctor was in Europe last summer but did not stop at Freiburg because "his mother and others of her day managed to get along without painless methods, and childbirth is no joy-ride under any circumstances." Another New York doctor considers the subject indelicate and almost advises a censor to keep such matters out of the public press. Over against the stupid brutality of such men as this it is gratifying to hear Dr. Henry Schwartz, of St. Louis, go out of his way in speaking on prenatal care to say that Twilight Sleep has called attention to the fact that "in spite of all modern advances, a large proportion of women do not receive the protection against pain to which they are surely entitled." He recognises relief from the burden of apprehension as an essential part of prenatal care.

The range of approval on the basis of small experience with Dämmerschlaf that ran in the meetings was wide. Dr. Cragin, of New York, who was observing chosen cases under Twilight in Sloane Maternity, was one of those who believes that it will be years before enough statistics are collected in America to form a definite judgment of the value of the method. Dr. J. Thompson Schell, of Philadelphia, declared unqualifiedly without awaiting the passage of years since Freiburg has had and recorded its ten years' experience that Twilight Sleep "is a distinct step in advance in medical science and deserves the support of obstetricians everywhere."

Those who reported large or small experience fell into three groups: out from cover came some physicians who at the time of the reckless experimentation of a few years ago had been of the cautious few spoken of before and who had continued their use, since they had had no accidents. Some of these had used the unstable and unsatisfactory hyoscin instead of scopolamin, and a fuller report on their experience would be necessary to judge of its value. Some of these are now stating that since they have learned the Freiburg technique and used the stable scopolamin their results have been wonderfully improved. Stable scopolamin, by the way, does not have to be imported from Germany, as Dr. W. H. W. Knipe has shown that Straub's Scopolamin haltbar can be prepared by a responsible druggist, from Professor Straub's published formula.

One of those whose use of scopolamin goes back to long before the Dämmerschlaf agitation is Dr. Bertha van Hoosen of the Mary Thompson Hospital in Chicago. She has had many hundreds of cases, has had no accidents, no

babies with breathing difficulties. She uses the Freiburg requirements in environment and regulation of dosage, but her dose of scopolamin is larger and her morphin is cut down to even smaller proportions than at Freiburg.

Among the older users of scopolamin-morphin in obstetrics was Dr. F. S. Newell, of Harvard, whose sensitiveness to pain in childbirth is illustrated by his reputed saying that it is almost better to deliver a sensitive woman by cæsarean section than to let her suffer the long agony of parturition with its subsequent breakdown. He is in a class by himself. He has used scopomorphin so skilfully in about 250 cases that he had little to learn from Freiburg. He does not believe, like Freiburg, that it can be used with all patients. He believes, that is, that there are some contraindications in the individual patient's physical condition. In this opinion his standing gives him some weight, though his experience is only one-twentieth that of Freiburg. His requirements in giving the sleep are like those of Freiburg, a hospital environment, a stable drug, and an intern administering, of a high degree of obstetric skill and responsibility.

CHAPTER VIII

Time Has Told: American Reports on Authentic Twilight Sleep

At the September, 1914, meeting of the American Association of Obstetricians and Gynæcologists were read the first two reports on adequate series of cases under Dämmerschlaf. There were Harrar and McPherson's report on 100 cases in the Lying-in Hospital in New York and Rongy and Arluch's report on about the same number at the Jewish Maternity Hospital in the same city.

At subsequent State and local meetings the work of many other hospitals has been reported on, verbally or formally, in Chicago, Cleveland, Washington, St. Paul, and many other cities. In New York there are a dozen hospitals. Probably there is no city of any importance east or west, north or south, which is not "trying the Twilight." Thus we hear that Dr. Wakefield is using it in his private hospital in San Francisco, that indeed he was using it long before the popular agitation began. In Boston the Massachusetts Homœopathic Hospital is said to be approaching its hundredth case.

On all these hospital experiences we can pass no judgment until their reports are published, for we do not know what method they are using.

There are at present in America two methods that go

under the name of Twilight Sleep: the true Gauss's Dämmerschlaf, and a method referred to by American doctors as Siegel's method.

Both these methods are at present being used in Freiburg Frauenklinik and have occasioned much confusion to the doctors visiting there.

Siegel's method is an experiment in fixed dosage which had been going on for about a year when the war broke out. It was started with a view to finding whether or not it was possible to work out a fixed dosage by which all women could be treated and the doctor saved the delicate adjustment which Gauss's Dämmerschlaf requires. It makes no study of the individual patient; it uses no memory test, supplies no carefully adapted environment, and is carried on simply by use of a hypodermic needle every hour and a half. Dr. Gauss hit its value off when he said of the method: "If you could trust to having an average woman, you could use an average dose; but the dose is easier to standardise than the woman." In practice, Siegel's fixed dosage tends to overdose both mother and child and makes the latter too deeply apnœic, even asphyxiated. For that reason, Freiburg Frauenklinik uses narkophin, a more harmless preparation than morphin in Siegel's cases. In the delicate adjustment required by the real Dämmerschlaf Gauss prefers minute doses of morphin.

Siegel's method has been used on only a few hundred cases, and is in every sense merely an experiment, not an approved method, at Freiburg.

Gauss's Dämmerschlaf, with its delicate adjustment of the amount to the individual, its memory test, and other

means of guiding every moment of the sleep, its special environment and all the elements that make it safe and successful, is the method used in all but one ward of the Freiburg Frauenklinik.

This is the only method that is safe to introduce into America.

But Siegel's ward is the free ward of the Frauenklinik, and this is the ward to which doctors who made only a few days' stay in Freiburg had readiest access. The only literature these doctors carried away from Freiburg was Siegel's short report on two hundred odd cases, not Gauss's series of reports on 3,600 cases in true Dämmerschlaf.

The experienced obstetrician seeing Siegel's cases, disapproved of the method heartily. It is under a misconception that Siegel's is the true Dämmerschlaf that Dr. Joseph B. de Lee, of Chicago University, has recently criticised the Dämmerschlaf. As he expresses in that very criticism an open-minded willingness to learn, there will be plenty to call the technique of Gauss's Dämmerschlaf to his attention for the new hospital wing where he offers to try it.

Younger physicians of less observation, experience, and judgment than Dr. de Lee came home from Freiburg with Siegel's monograph in their pockets and have been applying his dosage schema automatically to their patients. This schema is the greatest menace to scopolamin-morphin in America to-day. As long as it figures as "Freiburg Dämmerschlaf" any accident, great or small, which comes from its overdosing threatens the popularity of the real method.

Physicians who claim that Professor Krönig recom-

mended the Siegel method in his speech at Chicago in the fall of 1913 must remember that he said it worked all right in what he called a *normal* case—the "average dose for the average woman"—and that he recommended that Siegel's schema be used merely as a starting point, the average being varied to suit the individual. Many physicians will remember as an incident of that meeting that Professor Gauss, though Krönig was his superior, would not allow him to give out Siegel's schema, knowing that the tendency would be to apply it automatically.

Siegel's schema applies a certain fixed dose every hour and a half, and this may in some women tend to slow labour, in some cases prolonging it a great deal. A real case in true Dämmerschlaf will illustrate. A woman was given her first injection when the pains were five minutes apart; and three quarters of an hour later—about the usual distance apart for first and second doses—a second injection. Labour slowed down and pains came far apart. The intern, instead of giving the next dose one and a half hours after, as fitted in most of the cases he had had, called up the obstetrician, who extended the interval to three hours, when an average dose was given. By that time the pains were nearer together. But he would take no risks, and after an hour and a half gave only half the customary dose. After that labour proceeded normally. For reasons not relevant in this connection but connected with the condition of painlessness, it proved to be a particularly "beautiful case." It illustrates the importance both of adaptation to the individual and of a high degree of skill and judgment in the administrator.

Siegel's method is discountenanced by all doctors who

stayed at Freiburg long enough to learn the real Dämmerschlaf. Their chief fight is against it, as it furnishes just the easy means of using scopolamin-morphin without skill or judgment which an ill-equipped general practitioner would seize upon and work damage with.

As far as we can conjecture, we may by this time in America have equalled or surpassed Gauss's classic number of 3,600 cases under his true technique.

Four large New York hospitals using Gauss's Dämmerschlaf have published reports on a series of cases.

The work done in these hospitals has been excellent in proportion to the standard of the obstetrical work of the hospital.

The reports are all the more creditable considering the fact that none of the men administering Dämmerschlaf are Freiburg-trained in that particular.

This is a fact that would shock the rigid requirements of the Frauenklinik which will turn no man out as equipped if he has not had his two years' training in the application of all his obstetrical knowledge to the specific work of conducting Dämmerschlaf.

Nevertheless, granting this handicap, these New York hospitals have the literature of Dämmerschlaf, the detailed published study of the technique to build upon, and, considering their handicap, they have done well on this basis.

Of the two hospitals reporting at Buffalo, the work in the Jewish Maternity was conducted by Dr. Schlossinck, who had been an intern at Freiburg and had observed several Dämmerschlaf cases there, though this had not been his work. He came forward to answer the outcry of fraud

made against the Freiburg Frauenklinik in consequence of "sensational" magazine articles. He wished to prove that the Freiburg method was a legitimate medical procedure.

He worked quietly through the summer, and in the fall Drs. Rongy and Arluch of the Jewish Maternity were able to report about 100 cases.

As far as possible in a noisy East-Side street, quiet was obtained in the confinement room where these cases were delivered with darkness and as little coming and going in the room as possible. The memory test was used to regulate the dose.

Nine per cent. of the cases were unsuccessful in respect to the relief of pain. In four cases labour appeared to be lengthened in the second stage. About twenty per cent. of the babies had oligopnœa, or light breathing, but established regular breathing in almost all cases of themselves without stimulation of any sort.

On the basis of this experience Rongy and Arluch came to the following conclusions:

"Standard solutions are absolutely essential for the success of this treatment.

"No routine method of treatment should be adopted. Each patient should be individualised.

"Facilities should be such that the patient is not unduly disturbed.

"A nurse or physician must be in constant attendance.

"This form of treatment is carried out in hospitals, although there is no reason why it cannot be accomplished in all well-regulated private houses.

"It does not affect the first stage of labour, but the second stage is somewhat prolonged.

"Pain is markedly diminished in all cases, while amnesia (loss of memory) is present in the greatest number of patients.

"This treatment does not in any way interfere with any other therapeutic measures which may be deemed necessary for the termination of labour.

"To condemn or advocate a given therapeutic measure without a thorough personal investigation is truly unscientific and not in accordance with the tenets of progressive American medicine.

"Judging from our observations and experience, we feel that this method of treatment should be given a fair trial. It is only the varied experience of competent men that will tend to settle this extremely interesting subject. It is the duty of the medical profession to set the public aright on this very important question. For our part, we believe that this mode of treatment relieves the woman of the agonies of labour and in addition instils a feeling of confidence which materially aids her in passing through the trying ordeal."

A subsequent fifty cases confirmed the conclusions from the first series and the Jewish Maternity has installed the Twilight as a regular procedure.

We have quoted Harrar and McPherson's reason for undertaking their investigations. Their report covers 100 cases in the Lying-in Hospital in New York.

They go further than the Jewish Maternity report. Since they have had personal experience with the old method of using scopolamin-morphin they can compare

nesia. Twenty-five per cent. had partial relief. Of the rest, some were of the class known as refractory to narcotisation, the most part got their first injection too late in labour to have any effect.

Harrar and McPherson treated these cases side by side with a hundred births in consciousness, and made some interesting parallel observations.

They found two severe hæmorrhages and thirteen slight ones in their hundred cases without scopolamin-morphin; two fairly severe and eight slight hæmorrhages with scopolamin-morphin. In these cases and in general, the Twilight cases showed less blood loss.

The average duration of labour in the Twilight cases was two hours shorter than in those without. They believe shortening was in the first stage of labour; the second was somewhat lengthened. At first this lengthening alarmed them so that in the early cases they used the forceps rather more frequently than in the cases without scopolamin-morphin. Later they learned better. There was less laceration in the Twilight than in the other cases.

The testimony for the child in the series of births follows:

"As to the occurrence of fœtal asphyxia, in the hundred delivered without scopolamin, there were seven instances of asphyxia at birth, two of them requiring tubes and artificial respiration for twenty minutes. In the scopolamin babies the majority cried at once without any evidence of being under the influence of a drug, eight were moderately apnœic, but responded promptly to flagellation and tubes, and two required artificial respiration for fifteen and twenty minutes. The asphyxia that occurred was in

those cases where there was delay of the head on the perineum. Under the old technique the frequent severe fœtal asphyxia was due to the repeated doses of morphin." In this series asphyxia, the only dangerous breathing impediment at birth, occurred more frequently in the cases without than in those with scopolamin. This bears out Gauss's observation that this serious breathing difficulty is not caused by scopolamin-morphin.

It will be observed that in these cases Harrar and McPherson comment on the fresh and vigorous condition of the mother after birth and her rapid recovery.

For best results, say Drs. Harrar and McPherson, *"all the details of the Krönig and Gauss technique should be followed methodically."*

The two remaining reports are particularly interesting as showing how important is long experience to Twilight Sleep. To the obstetrician equipped with both insight and training, painlessness counts for much in the birth process.

Drs. W. H. W. Knipe and J. O. Polak reported in October two groups of cases: the one in Gouverneur and the other in Long Island College Hospital. To-day these two hospitals must have between them at least 300 cases.

These two men are among those who went to Freiburg in the summer of 1914; they are also both among those who had tried and failed with scopolamin-morphin in the past and had discarded it as dangerous.

They both ascribe their early failure to ignorance of the Freiburg technique, and Polak expresses the emphatic belief that the women and babies in the experimental days in America were morphinised. He believes that the cutting down to the minimum of morphin is one great ele-

ment in the superior safety of the Freiburg method. Of the experience of Freiburg he says in general:

"They have recently published a report of 4,111 cases of labour in which narkophen or morphin and scopolamin have been used, with a lower fœtal and maternal mortality than has been secured in any other clinic in Europe. These results have been attained, first, by individualising the patient; second, by limiting the number of vaginal examinations, and giving each woman a full test of labour, without reducing her physical strength by subjecting her to nerve-racking pain."

His general account of the full significance of painless labour to the birth process is so interesting as well as authoritative that we must quote in full:

"We contend a woman is entitled to the relief of pain during labour, if she can get it, *without undue risk either to herself or to the unborn child.* We no longer ask our patients to submit to surgical operations without ether or gas; many of us use ether or chloroform as a routine during the perineal stage in ordinary labour; we likewise narcotise the woman for a forceps delivery or primary repair of the pelvic soft parts. Why not extend this comfort throughout labour by producing amnesia and analgesia with safe doses of scopolamin, which does not, if judiciously used, affect uterine contractions when they are once established?

"You say labour is a normal and physiological process; one wouldn't think so after twenty-odd years of consultation obstetrics in Brooklyn and New York. Over fifty per cent. of all of our gynæcology is the result of badly

conducted physiological labour. Poor diagnosis in labour is more frequent than in any department of medicine and surgery, except perhaps in cancer. The practitioner has not made the progress in the art of obstetric diagnosis and procedure that he has in other branches, or he is blinded by the dictum that it is all a normal process.

"Many of us seem to forget that the cervix must be open before the child can pass through it; others delude themselves into the idea that they can artificially dilate the soft parts as perfectly as with nature's processes, and few of us give nature sufficient time to prepare the way. Dead and mutilated babies, torn and prolapsed organs, with resulting morbidity from infection, are some of the causes which have produced this public demand for adoption of the Freiburg method.

"We educate the public how to prevent disease; they are going to educate us how to prevent many of the disasters of childbirth by insisting on better antepartum and interpartum care.

"Painless labour by partial narcosis with scopolamin and narkophen is an assured fact, and when used in properly selected cases, where the fœtal and pelvic relations are normal or approximately normal, it permits nature to take time to perfectly prepare the cervix, vagina, and vulvar orifice for the passage of the fœtus without producing in the woman physical or muscular fatigue.

"It is easier to dilate the sphincter ani under anæsthesia than with the patient conscious; so it is easier to dilate the cervix when the pain of this dilatation is not felt by the patient, than when the circular muscle is in spasm;

particularly is this so when the dilatation is accomplished by those forces intended for this purpose.

"The advantages, therefore, of painless labour are less nervous shock, less muscular effort, and easier and more prompt cervical dilatation. Our observation proves that scopolamin and narkophen actually shorten the first stage of a primiparous labour by more promptly overcoming the soft parts' obstruction. This is not so of the second stage, which may be prolonged beyond safe limits if the attendant is not keeping close watch of his patient.

"Scopolamin-narkophen anæsthesia is not without danger; neither is the production of narcosis with ether free from accident or complication; yet, in proper hands, these dangers can be and are minimised.

"The mother may be particularly susceptible to scopolamin or morphin, the former causing delirium, the latter coma; or the respiration may become arhythmic, and reduced to five or six per minute. The kidney secretion may be diminished or anuria develop; labour may be prolonged, especially in the second stage. Uterine atony is possible, and postpartum hæmorrhage has been charged to the method by some American observers.

"In our clinic we have found that all of the above-mentioned dangers are exaggerated and are due to too much morphin and can be anticipated and prevented by intelligent administration, by the use of the minimum dose to produce sleep, the individualisation of the patient, and the very free exhibition of water throughout the narcosis.

"It has been claimed, by the critics of this method, that the child is apt to be asphyxiated and narcotised; this again is not the fault of the method, but of the dosage.

The child does participate to some extent in the Twilight Sleep. Many of the children suffer from oligopnœa for several minutes, and it is common for the child not to cry for two or three minutes after birth, though the fœtal heart may show little or no disturbance in rate of rhythm; there is, however, no cyanosis unless the dosage of morphin has been too large or given at too frequent intervals, or the second stage has been allowed to continue too long.

"The child after stretching itself, as if awakening from a restful and peaceful sleep, cries as lustily as the ordinary newborn infant. As the patient may be wholly unaware of the progress of labour, even during the perineal stage, it is not uncommon for the fœtus to be delivered unannounced, as the change in the character of the woman's pains may not be noted by the attendant, unless the vulva is exposed. It is possible, therefore, for the fœtus to drown in the gush of amniotic fluid, should such an accident go unobserved.

"From our observations both here and abroad, we are convinced that there is no reason why Dämmerschlaf should not be given to all women who show the physical signs of active labour, provided that the woman is under continuous and intelligent observation.

"It is particularly indicated in nervous women, of the physically unfit type, in their first labour, for it is in this type of women that labour has most often, in ordinary practice, to be terminated artificially, owing to the physical exhaustion so common at the end of the first stage, before cervical dilatation is complete, or in the second stage, when no more force can be brought upon the uterus by the abdominal muscles. The usual obstetrical interfer-

ence by forceps in the presence of unprepared soft parts results in a permanent morbidity, and it is the largest contributor to our collection of chronic invalids.

"It is just in this class, the physically unfit, that scopolamin will give the best results, for by its use we are able to attain full dilatation of the cervix by the physiological factors—*i.e.*, the bag of waters and the force of the uterine contractions—before the patient begins to show signs of physical tire. In dry labours, the exquisite pain which is produced by the pressure of the presenting part on the sensitive congested cervix is relieved and the cervical ring relaxed. The presenting part is therefore driven through the pelvis and well into the vagina, and low forceps in a dilated passage is the most serious intervention to which the woman is subjected. Operative traumatism is thus reduced to a minimum. Surely scopolamin would *be worthy of a place in midwifery,* were it only to secure for us, as it does, full dilatation of the cervix.

"All of us of any obstetric experience have noted the effect of a full dose of morphin near the end of the first stage, in dry labour, and have seen the cervical ring actually melt away under its influence; this is accomplished by allaying restlessness, allowing the woman rest and sleep between the pains, diminishing the cervical sensitiveness and relaxing the cervical spasm. Scopolamin-narkophen analgesia does all this, and in addition permits the labour to proceed without the patient having further knowledge or memory of subjective pain.

"There can be no doubt that dry labours, due to early rupture of the membranes, will afford an excellent field for Twilight Sleep. Borderline contractions will offer

another indication for its trial, for all primiparæ with borderline contractions must be given a test of labour before instituting operative measures: This means that the cervix must be dilated, the membranes ruptured, and that the uterine contraction, aided by proper posture, be given a chance to drive the presenting part into the pelvis. This all takes time and effective labour pain. These patients are in need of rest, because having labour pain is work, and work exhausts. Under combined analgesia the woman may be carried for hours without showing any of the classical signs of exhaustion, in the character of the pulse or in the character of the labour pains, and if operative delivery is indicated in the interest of the mother or child, it may be accomplished with less general anæsthesia."

Polak alone among doctors using scopolamin-morphin or scopolamin-narkophen in general fearlessly applies Gauss's rule of using it in all cases; he recognises, that is, no "contraindications." In the cases reported at the Long Island College Hospital there have been no failures in respect to painlessness. There has been occasional slowing of the second stage of labour, but there has been no injury to the birth process. Instead, there have been those improvements in the normal process which his general statement just quoted brings out. Only two children showed temporarily impeded breathing and, of these, one case was due to other causes than the narcotic.

In Dr. Knipe's series at Gouverneur there was a small percentage of oligopnœic babies, but all but three of these had the cord wound twice around the neck. These three soon got their breath. He believes that any marked de-

gree of oligopnœa is due to an overstepping of the Twilight zone and with proper dosage oligopnœa is unnecessary. This overstepping he holds is due to the cumulative effect of doses too near together. Skilful use of the memory test he believes obviates this, as by following this means of regulation one dose is used up, so to speak, before another is given and no surplus accumulates. Though oligopnœa unless very deep is not a dangerous condition, he believes that it should be avoided.

Cumulative overdosing, or overdosing at the beginning of labour—"forcing" the Sleep which Gauss strongly argues against, instead of inducing it gradually—Dr. Knipe believes is responsible for any serious slowing of the mother's labour that has been observed and other disagreeable effects sometimes encountered from scopolamin-morphin.

In general he believes that under properly conducted Twilight Sleep there may be some slight slowing of labour, possibly a half hour to an hour, but no alarming retardation.

In the Gouverneur series of cases seventy-eight per cent. of the mothers had complete amnesia, only ten per cent. were completly uninfluenced by the narcotic.

Dr. Knipe expresses enthusiasm for the remarkably quick recovery of his mothers, and he recommends the active convalescence and the muscular exercises customary at Freiburg, which he believes restore the organs to their position and their strength more quickly than the usual mode of convalescence from childbirth. He and Dr. Polak are alone among American doctors in recommending active convalescence, but his arguments are strong, and the

Gouverneur Hospital in New York, where MRS. HANS LEUDERMAN'S BABY was born in January, 1914, has reported success in over 100 cases of Twilight Sleep, and is the only American clinic which employs the "active convalescence" of Freiburg.

(a) "Barbara Jane," born under Twilight Sleep at the Wesley Hospital, Chicago, September, 1914. (b) Mrs. Francis Xavier Carmody and her little boy, Charlemagne, born July, 1914, while the visiting American doctors were at Freiburg, converted at least one famous American obstetrician to Dämmerschlaf.

method works excellently at Freiburg. The form of convalescence has, of course, nothing to do with Twilight Sleep, except that such activities would be quite impossible for a mother convalescing from the traumatic shock of a painful birth.

All the doctors comment on the mothers' eagerness to get up after a painless birth, although some will not allow them to.

In their successes both Polak and Knipe followed rigidly all the rules of Gauss's Dämmerschlaf procedure. They believe, like Krönig, Gauss, and Newell, that for success and safety scopolamin-morphin-seminarcosis demands the hospital and the attendance of a skilled and responsible obstetrician.

"Twilight Sleep," says Dr. Knipe, in the *Medical Record,* "undeniably demands more care, more thought, and more knowledge than a normally conducted labour. This increased attention paid to childbirth must result in better obstetrics by the general practitioner. This in turn will increase the respect of the public for obstetrical care and obstetrics in general will be held in higher esteem by physicians themselves. As a result of all this, there will be fewer stillborn children, fewer mothers sacrificed, and the number of invalids following neglected labour will diminish markedly.

"Inasmuch as most obstetrical cases must be attended by the general practitioner—and then frequently in communities where no hospital exists—it will become necessary to establish local hospitals where the physician may send his patient to have the Twilight method administered by a nurse or physician trained in this method. When

the time of delivery approaches the physician may be notified so that he may deliver the child in the hospital. This seems to me the practical solution of the problem of how the large mass of the population is to receive the benefit of Twilight Sleep, for, of course, it becomes impossible for a man with an active general practice to give the uninterrupted attention to his obstetric cases that the Twilight method demands; and unless continued observation of the patient in Twilight Sleep is carried out by some one accustomed to the technique it is better not to attempt the method at all."

This open hospital should come soon to facilitate the demonstration and the widespread dissemination of the knowledge of Dämmerschlaf technique; for while the work is being carried on successfully in the hospitals not originally equipped for it, its added burden is carried by medical and nursing staffs which have not been increased as at Freiburg, although hospitals where Twilight Sleep is known to be administered are receiving more than twice their previous rate of maternity cases.

Dämmerschlaf, at the moment that war threatened its continuance at Freiburg, was transferred to America and rechristened the Twilight Sleep. Four or five million women came to its christening. These sponsors will be kept informed of its development; most of all, they will be kept informed when and how it is threatened.

Twilight Sleep is to-day threatened in three ways:

(1) By haphazard use by the general practitioner.

(2) By the spreading of the Siegel method of fixed dosage.

(3) By the inhibitive influence of that group of ob-

stetricians who urge putting off a decision as to its value for two or three years.

When the two women who had made a pilgrimage to Freiburg returned to New York and found the widespread enthusiasm and the demand to learn more, they decided to appear in the open market-place. They could have spoken, they did indeed often speak, before intellectual audiences under very respectable auspices; but the ordinary woman who does not belong to clubs was begging to hear.

They believed that it was not the conventionality of the place they spoke in, but what they said that mattered. So they spoke where the mother of the family does her household buying, in the department store. They were advertised between the marked-down suits and the table linen.

One of these Freiburg women brought her baby to show that he was neither retarded in his physical growth nor developing into an idiot.

They brought also the woman who had packed her trunk and hurried to Freiburg when she read the first "sensational" article on Twilight Sleep. She brought her three months' baby. She was a woman in private life, but the occasion raised her above the shyness of the woman in private life. She delivered her message from her own experience as spontaneously and with as little consciousness of self as though she were not personally involved.

She was only surpassed by the tenement-house mother who, with her new Twilight baby in her arms, stopped on a street corner to tell a friend of her experience. The

magic word Twilight Sleep collected a crowd. She lifted up her baby, then, for all to see, crying impulsively: "This baby was born in —— Hospital a week ago without pain!"

The response is as spontaneous as the appeal. The women are hearing a matter of life and death to them. They are contemptuous of those medical reviews which suggest an injunction against the speakers, or express shame that women can themselves "do violence to those reserves and delicacies which usually surround the lying-in chamber."

To the women listeners this squeamish delicacy of the male obstetrician seems an outrage. A tragic emergency raises the sufferer above the conventions. Childbirth has for every woman through all time been potentially her great emergency. Nothing could prove this better than the testimony of personal experience offered at such meetings.

And nothing could prove better the women's grasp of what is offered to them than their eager acceptance of the hospital in place of the traditional home confinement.

At one meeting thousands of dollars were offered in small sums and with a confidence in the unknown speaker that was pathetic.

The women, like the doctors, want the Twilight Sleep only under those conditions of hospital care and the best obstetrics, laid down by Freiburg, and designed to insure the safety of mother and child.

CHAPTER IX

A Dozen Anæsthetics and the Forceps

When the demand of the mother's fear and pain became too poignant to refuse relief, or when pain threatened to work havoc with the normal birth process, obstetricians have had some dozen anæsthetics to give brief alleviation.

The general practitioner who to-day attends most births knows few of these. Chloroform or ether, or the alcohol-ether-chloroform combination, are his resources. Even these he seldom uses except at the end of a birth. "I have never had but one birth that was naturally painless," said one country doctor, "but I have never used an anæsthetic except where operative assistance was necessary."

This man has used in his practice that cruel power, "the doctor's discretion," which women are attacking since the possibilities of painlessness by Twilight Sleep have been known to them. They took their doctor's word before. They are now beginning to believe, with Dr. Reynolds of Harvard, that the use of painlessness should be at *their* discretion.

Whatever the value of his narcotic, one general practitioner, Dr. M. W. Kapp, shows unusual sensitiveness. He writes in the *Medical Record* of his three years' use of heroin in about a hundred confinement cases.

"The dread and agony of the parturient mothers," says

Dr. Kapp, "has always worried me. Motherhood is such a sacred condition and it should be such a happy condition from its first moment through all its stages. With so many the dread of the hours of labour depresses them, and without any question has its depressing effect on the child."

Most family doctors hurrying on their rounds can walk cheerfully out of the room when the screams become too distressing, after reassuring the mother that everything is going beautifully and, as one said recently, the "best salve for her suffering is Spartan courage."

They have accepted pain as an inevitable accompaniment of labour; few know that it can even be lessened in intensity. Many still believe that labour could not progress normally without pain, and very many are still guided in watching the course of labour by the mother's cries.

Few general practitioners could have the time or the delicate skill to administer any of the obstetrical narcotics safely and successfully.

But the obstetrical specialist is better equipped. He has known his dozen anæsthetics. In many cases it is true he has dismissed them after short and unconvincing experimentation.

A very common statement by important American obstetricians at the outset of the Twilight Sleep agitation was that physicians knew and used customarily better and safer narcotics than scopolamin-morphin to assuage the pains of labour. Drs. C. M. Green of Harvard, Whitridge Williams of Baltimore, and Joseph B. de Lee of Chicago, are quoted by the newspapers to this effect.

This statement came as a surprise to most child-bearing women. Even in regard to obstetrical specialists, it needs considerable modification.

In most cases this assuagement is merely the brief use of chloroform at the end. In chosen cases it is that imperfect intermittent use of chloroform *à la reine* or ether throughout the birth merely to blunt the acuteness of the pain which is described in another chapter. Two women who had this treatment from one of the greatest obstetricians in America have recently demanded Twilight Sleep of him.

Most of these experts judge for themselves when pain relief is necessary throughout the whole course of a birth. Many reserve it for a first child; some even further limit it to "primiparæ" of advanced age. The Newells and the Reynolds of American obstetrics are rare. The criterion of the others is seldom suffering alone, but suffering when it becomes a serious impediment to the birth process. A half dozen narcotics can be used in the early stages, ending the birth with ether.

Most obstetricians use painlessness at the final delivery, and there are chlorethyl, methylen, and a great number of other inhalation anæsthetics besides chloroform and ether. It is doubtful whether these are superior to the older narcotics.

From time to time obstetricians have made small experiments with different narcotics. A dissertation by a German, August Johnen, brings together the experience in Europe and America. The demand for Twilight Sleep has brought out the use of many more.

The smallness of the experience on which conclusions

are based, the contradictoriness of the results by two men of equal reputation, and the lack of standardisation are the things most striking in the experience with all narcotics.

On the basis of haphazard use in eight cases a great obstetrician gave up one narcotic on the ground that it prolonged labour and caused postpartum hæmorrhage. It has since come into common use.

For every obstetrician who makes a favourable report on the basis of his inadequate experimentation with half a dozen cases, there arises another who reports unfavourably on the basis of his half dozen. A few have persisted, until statistics of success are fairly large.

The very large but unstandardised experience with ether and chloroform has been told in detail. These are the only narcotics which, uncombined, have been used in a great number of cases over long periods in labour, like scopolamin morphin in Twilight Sleep.

In England, where their use was first worked out, these are the favourite obstetrical anæsthetics. The English use is probably more skilful than that of any other country.

In Germany Krönig and Gauss, the *enfants terribles* of obstetric anæsthesia, have kept scopolamin-morphin before the obstetrical public. Those users who have followed the standard of Freiburg have had success. This is the only obstetrical anæsthetic which has developed a technique.

America has no special narcotic for childbirth, perhaps because it is more backward than any other country in general anæsthesia.

The use of cocain originated here. It was used with great perfection in combination with scopolamin or with hyoscin by the obstetrician Marx in New York. But cocain, stovain, eucain, and novocain have been taken over by France. The greatest experience has been with cocain. Dr. Fyffier has had in his clinic the large number of thirteen hundred mothers treated hypodermically with cocain. Drs. Doleris and Malartic have also had a fairly large experience. The total recorded experience is now about two thousand cases.

Cocain is suitable for only the later stage of labour; it is undependable, its effect sometimes wearing off with unexpected suddenness, but it almost always gives some relief. As it is injected directly into the spine, it requires great precautions and skill, but no more than the obstetrician should be able to furnish.

Hypnosis is another method of painlessness which has been developed in France. It is beset with such difficulties that it has a very limited application. It is successful only when both doctor and patient have the right temperament and co-operate with each other in trying to reach the hypnotic stage known as somnambulism. If the condition passes out of this extremely delicately balanced state into lethargy or catalepsy, labour is interrupted. Drs. Auvard and Sechegron record attempts by themselves and others to hypnotise a very large number of patients. Out of the whole group about a dozen women, of the hysterical type, proved to be hypnotisable. With these the condition lasted only through the second stage of labour, being broken into by the violent pains of the expulsion stage.

Many obstetricians speak of the long-continued and

exhausting pains of the dilatation or second stage of labour as harder on the mother than the short, frenzied agony of the expulsion stage.

We have told how Steinbüchel substituted scopolamin-morphin for simple morphin with no other object than to give snatches of sleep between the tiring dilatation pains. Morphin is sometimes still used for this purpose. Many physicians who will not use scopolamin-morphin throughout labour, use it, not infrequently in the inferior form of the unstable hyoscin, for dilatation, using ether at the moment of delivery. Franklin S. Newell, of Harvard, frequently uses this combination, instead of Twilight Sleep throughout the whole birth.

Another combination by which painlessness can be eked out throughout labour is codein, digitalin, and strychnia, with a dash of ether at the end.

Antipyrin used hypodermically has not infrequently given some relief in the early stages of labour. It seldom does more than to lessen the suffering. This is also true of chloral.

Dr. H. C. Adams, of New York, claims that a perfect painlessness throughout labour can be obtained by nitrous oxide and oxygen.

This combination is becoming recognised as the safest of surgical narcotics, and both Dr. Allen and Dr. H. Bellamy Gardner, of London, believe it to be equally safe and efficacious in labour.

It has the disadvantages of even the perfect chloroform *à la reine* or ether in demanding drop-by-drop administration and in subjecting the patient to all the disagreeable impressions that go with the administration of in-

halation anæsthesia. In surgery scopolamin-morphin is often used so that the patient shall be spared the terrors and discomforts of the final inhalation. In obstetrics scopolamin-morphin in Twilight Sleep can do away with this inhalation entirely.

Premature delivery by artificial means in the eighth month was offered one of the writers by an American obstetrician. Her pelvis was slightly smaller than the average, and he feared that if he let her go to term the birth might be slow and painful. "An eight months' baby should have at least as good a chance as a seven months' baby," said this doctor. At Freiburg later she was confined under the slow waiting method without pain. What premature delivery, as a means of lessening the mother's pain, means to the child is expressed by Dr. A. van Couwenberghe:

"It introduces into the world," says he, "a being whose organs are not perfectly developed and who is physiologically insufficient, with muscular system undeveloped and circulation and respiration precarious."

In proportion to the number of children born into the world there has, all told, been little pain-lessening at birth. In what relief has been given, the form that has been commonest has been the "alleviating" forceps, with its demonstrated dangers to mother and child. All the other means have been for the majority of obstetricians too much trouble. Few have felt like Reynolds that for the alleviation of pain the "time of the obstetric attendant is not his own." Hurrying from one case to another, both obstetrician and general practitioner have used the forceps,

early or late in the labour, when the mother's patience or her strength was failing her.

We have quoted Dr. Krönig before in regard to the forceps. He states the dangers to the mother even more exactly:

"Although in the hands of a skilled operator the forceps is not so dangerous as in those of an inexperienced one, yet for those who know how great is the local susceptibility to infection it is hardly necessary to say that the chances of a favourable confinement and recovery are considerably diminished by any operation.

"If you follow the lyings-in, even in the best hospitals, you will find the number of cases of temperature considerably higher where there was not spontaneous delivery. In the unfavourable external circumstances of ordinary practice, all these injurious results increase. The great increase of the spread of puerperal fever corresponds to the increasing frequency of operations shown in the statistics of the larger towns.

"It might have been thought that the introduction of asepsis in obstetrics, and its careful application outside the hospitals as well as in, would have decreased the number of deaths in childbirth in comparison with those under former conditions. But we note a not inconsiderable increase. Every one agrees that the absence of reduction in the number of cases of puerperal fever is chiefly caused by an enormous absolute increase in the number of operations, and especially a huge increase in deliveries by the use of forceps."

Dr. Polak's arraignment of the forceps is even more startling. It shows that pain demands the relief of the

forceps in a way that is particularly injurious: that is, before the birth process is far enough along to make it safe. Drs. J. Clifton Edgar, A. Lapthorne Smith, and Whitridge Williams have recently and forcibly pointed out the dangers to mother and child of its indiscriminate, premature, and unskilled use by very many physicians attending childbirths. But none of them express themselves so tellingly as Dr. Polak:

"Many of us seem to forget that the cervix must be open before the child can pass through it; others delude themselves into the idea that they can artificially dilate the soft parts as perfectly as with nature's processes, and few of us give nature sufficient time to prepare the way. Dead and mutilated babies, torn and prolapsed organs, with resulting morbidity from infection, are some of the causes which have produced this public demand for adoption of the Freiburg method."

Against no anæsthetic has a case been made as strong as this; and for one birth made spontaneous under some form of painlessness there are a hundred relieved by the forceps.

Almost at the same moment that the facts about Twilight Sleep were first placed before the public the newspapers announced in short paragraphs that France had discovered the perfect obstetrical narcotic. The clippings daringly called this drug itself, "Painless Birth."

CHAPTER X

A French Experiment of To-Day

Ribemont-Dessaignes, member of the French Faculty of Medicine, for years professor of Obstetrics at the Academy, and head of Beaujon Maternity, is the first scientific advocate of painlessness in childbirth to base his whole case not on humanitarian grounds, but on the actual superior safety of the removal of pain; checking up point by point the processes of birth and pointing out how many abnormalities and impediments in the birth process are removed by eliminating the element of pain.

The abolition of the element pain from the element contraction was such a radical feat that it stripped the observing obstetrician of most of his semaphores of custom. A new set of signals replaced the classic cries of antiquity. Hysterograph records were taken of the period of contraction and of expulsion, and these showed the pains of undiminished vigour and regularity; these also showed that the contractions which after the first analgesic injection were painful, were so for a diminished period each time, ending at the apex of a contraction with a mere flash of pain, after which the contractions continued with their full volume, in perfect painlessness.

A new world of obstetrics, in which the birth process could be followed as a supreme muscular function, was

opened to the breathless veteran obstetrician and his staff. An infinite variety of clinical proofs was collected, showing how quickly the drug acted on the pain element, and yet how neutral was its influence on the force of the contractions, while it seemed in some cases to hasten dilatation. The normal duration of the birth period, an average of fourteen hours, was found not to be appreciably lengthened, and was even in some cases shortened.

Ribemont-Dessaignes says in his report:

"I am thus justified to affirm authoritatively that the labour is not lengthened under this analgesia; I am inclined to think that it may, in certain conditions, be even shortened. No obstetrician has failed to observe the despairing slowness with which dilatation progresses in some women, in spite of the fact, or perhaps *because* of the fact of the excessive violence of their pains. These women, directly they are in the state of analgesia, dilate with a remarkable rapidity. The spasm of the uterus which seems to be inhibited by pain, cedes as soon as this pain disappears. I have had many occasions to observe this. It is the same with a woman whose contractions are accompanied with lumbar pains: labour is always longer in these cases. The suppression of these terrible pains, so apprehended by women, favours the regularity and rapidity of labour. The period of expulsion which comprises the passage of the fœtal region that presents itself through the external orifice of a completely dilated uterus, its complete descent right down to the perineal floor, its intrapelvic rotation, and finally its expulsion outside the genital organs, seem to me facilitated and shortened.

"We can give two reasons for this: On the one hand,

the woman whose dilatation presents itself while she sleeps and who has not suffered, is full of confidence and courage, and as the particular sensation which carries by reflex the necessity of making an effort, never fails, the woman pushes, to use the classic phrase. She pushes silently, but she pushes with all her force, happy to feel the progress of her child which each effort brings nearer the goal. On the other hand, the muscles of the perineum allow themselves to distend and do not react as they usually do."

Like Krönig and Gauss, Ribemont-Dessaignes stands amazed at what the removal of pain means to the convalescence. He likens the recovery from shockless childbirth to the recovery from shockless surgery, instancing the importance that American surgeons, the Mayo brothers in particular—to whom he might have added Crile—attach to such shock elimination. "Our patients," he says, "have experienced no shock, no exhaustion; feeling not even fatigue, not even mental anxiety; they have undergone no physical duress; we do not observe in them the depression, the nervous excitement so often seen.

"Those mothers of many who are subject to violent after-pains have observed with delight that the pains they were expecting did not come, as such births have been quick and the analgesia has lasted beyond the birth."

While Krönig and Gauss found the readjustment of the organs after birth to be perfectly normal, Ribemont-Dessaignes has found this readjustment positively aided. "The involution of the uterus and in consequence its re-entry into the pelvic cavity are manifestly accelerated, as the bottom of the organ, by the end of the ninth or

tenth day, met the symphysis pubis, in all my cases, who all nursed their babies."

Both Pinard and Ribemont-Dessaignes express enthusiastic satisfaction at having had their patients already in a condition of analgesia in those cases where minor operative interference is suddenly found necessary, such as manual assistance in the birth, stitching after lacerations, etc.

It is curious comment on the attitude towards pain in labour, that even the sympathetic obstetrician in the hospital is not in the habit of troubling to give a few moments of anæsthesia for these stitchings after lacerations; for Prof. Ribemont-Dessaignes says naïvely: "These few stitches, when necessary, have heretofore been very ill received by the patient."

He and Prof. Pinard have also added their experience to the accumulation of evidence, coming from all parts of the obstetrical world to-day, that artificial painlessness is an ideal method of treating eclampsia, those convulsions due to uremic poisoning, that are not unusual in childbirth or late pregnancy.

The story of Antalgésine is the story of an experiment.

It is not to be confounded with the authoritative method of painless birth at Freiburg. Until there is a sufficient body of statistical data on which to base a judgment, it must be looked upon as an experiment, but an experiment which has the endorsement of the greatest men in French obstetrics to-day. It may be only the whirlwind of enthusiasm dying out, for the most part in failure, that followed Steinbüchel's first use of scopolamin-morphin. Ribemont-

Dessaignes' 112 cases prove no more than Steinbüchel's 20 cases, and we know the disappointment that followed them, before the proper use of scopolamin-morphin was worked out.

"We wanted something for the provinces," said Professor Ribemont-Dessaignes, the dean of obstetrics in France. "We think we have found it."

What the French obstetricians believe they have found is that they can achieve painless childbirth by means of this new drug more simply than Krönig and Gauss have done with Dämmerschlaf or Twilight Sleep. It is a wonderful thing that on the basis of a study of some one hundred cases French clinicians have spoken with such enthusiasm for Antalgésine and have put it into immediate use in their own clinics. They wanted something for the provinces; the provinces produced it and gave it to Paris; Paris has received and given it back. But it has not yet received the seal of the French Academy of Medicine.

The pharmacologist, Pouchet, gave Ribemont-Dessaignes the following memorandum:

"From a chemical point of view the drug comes very near the oxydimorphin of Marmé; it seems to be a product of hydration and hydrogenation of morphin, of which it possesses not one of the chemical reactions supposed to be characteristic. It precipitates but little all the general reactives of the alkaloids.

"From the physiological point of view, it constitutes a substance embodying extremely interesting pharmacodynamic properties. If one may so put it, it places the animal organism in an exquisite state of receptivity

towards such medicaments as strychnin and digitalis, of which it attenuates in a considerable degree the toxic manifestations, and in a totally different fashion than is realised with morphin.

"Like this last, it manifests very accentuated vasomotor reflexes, and exercises a remarkable action on the respiratory mechanism. The reflex excitability is very decidedly exaggerated.

"Its influence exerts itself in a very special way on the brain and the great sympathetic nerve.

"In animals it differentiates sharply from morphin by a marked excitement of the salivary and intestinal secretions, also of the urinary secretions, but in a minor degree. . . .

"The cerebral influence manifests itself at the start by something that resembles inebriation.

"Used intravenously its effect is instantaneous. A dog injected intravenously with 1 cc. fell headlong asleep and slept profoundly and without interruption for more than 12 hours."

In Ribemont's experience, antalgésine produced complete painlessness in about fifteen minutes; in the hands of an experienced hypodermic anæsthetist, who might wish to use it intravenously, it can be effective instantly. It was effective even when employed late in labour, as severe pain does not interfere with its first action. It required no special environment, and could be employed in private practice or the noisy ward of the hospital. Its characteristic is the abolition of pain perception in full consciousness; this is so typical that the chemist who worked with it for two years believed firmly that its influence was local,

not cerebral, as is really the case. It appears to stimulate muscular activity in labour, and to have a much stronger narcotic effect than morphin. Its use in childbirth in France has been entirely without disagreeable after-effects on the mother. This is also true as shown in the reports published by an American obstetrician, although the American experience is at present too slight to be of more than corroborative interest.

But what is of importance is that the leading obstetricians of France have now spoken emphatically for painless childbirth, not alone from the point of view of its humane desirability, but for its value to obstetrics. The discovery, by Georges Paulin, of a drug which can be employed to induce and maintain painlessness over a long period, without prejudice to muscular activity, and without the meticulous care and environment necessary to Twilight Sleep, has made their occasion. The drug placed in their hands is ideally suited to the sceptical French temperament; for in France, as an anecdote of Prof. Ribemont's will presently show, none too much blind confidence is placed even in the most illustrious practitioner; and French women who desire painless babies prefer to have the painlessness induced in such a way that they do not lose their alert consciousness of the situation.

Prof. Ribemont-Dessaignes' formal report, which covers an experience with 112 cases in which the new drug had been used, was made at the July 21st meeting of the French Academy of Medicine. This report is published as Bulletin 28 of the Academy of Medicine for 1914, by Masson et Cie, Paris.

Prof. Ribemont-Dessaignes has for many years been

professor of obstetrics of the Faculty of Medicine, and head of the Beaujon Maternity, near the Ternes. He shares with four other French specialists the curious French designation of *"Accoucheur des Hôpitaux."* His colleagues under this title are Pinard, Couvelaire, Bazy, and Hartmann.

Therefore the effect of his communication to the Academy was, as French clinical papers put it, *"retentissante."* It was, indeed, heard round the world, and was the last message of obstetrical science in Europe before the war preparations dropped the curtain of silence. It reached us in Germany by way of a clipping from a Chicago paper.

In Germany it was not possible to obtain a copy of Bulletin 28; obstruction of the mails followed too closely on the heels of mobilisation.

It was not possible in London. We learned, on reaching London from Freiburg, that this extraordinarily interesting document would not be received at the British Medical Association Library until after the close of the war.

So we went to Paris for it. Paris afforded the opportunity for several talks with Professor Ribemont-Dessaignes, as well as with friends of the chemist whose discovery perhaps places an entirely new drug at the service of obstetrics. And lest it should be laid at Professor Ribemont's door that he lent himself to a journalistic interview, we may as well confess that it was not as journalists that we approached him, but as students of obstetrical semi-anæsthesia.

It was just a few days after the removal of the French Government to Bordeaux. Paris was a city of closed houses and of shops whose window fronts bore hastily

scrawled legends such as: "The proprietors having gone to join their reserve regiments and the employés having been mobilised, these premises are left in the care of the public."

But at the doctor's house, near the Arc of Triumph, in a quarter deserted by all except the American Embassy, we learned that although it was the hour of Prof. Ribemont-Dessaignes' consultation, he was out attending to the work devolving on him by reason of the absence at the front of his younger associates.

Later we found him at home. Like many of the older Parisians who stayed at their posts during the approach of the Prussians, he was entirely alone. How literally alone such men stayed while families and women servants refugeed to the Normandy coast and the men servants were mobilised, was evidenced to a visitor in the simplest way. They opened their own doors.

Small, wiry, impulsive, humorous, the celebrated scientist recalled the well-known American figure of Gen. Joe Wheeler. We were not surprised to find him much cast down that age limitation barred him from serving in 1914 as he had done in 1870. He was getting what compensation he could out of the routine work of his hospital and city practice; enthusiastic about his new drug and employing it in every case where the patient consented.

"It is all Paulin's work," he said modestly. "Paulin—the chemist. He's the man that has invented the drug. He called it at first 'Tocanalgine'—'Painless Birth.' It is now 'Antalgésine.'

"A friend of mine, Dr. Laurent, brought Paulin to me. Laurent had had some cases where he had used the Antal-

gésine. He was enthusiastic. I was soon satisfied they had something I could not do better than investigate."

In the small hours of a winter night about two years ago, the new drug, Antalgésine, was a nameless ferment in a great jar sitting on a shelf in the suburban laboratory of Georges Paulin, a French chemist.

To Paulin, whose laboratory window shed the only light abroad in the sleeping village, came the frenzied husband of a woman at the point of collapse from agony in labour. The doctor had sent him out to get morphin.

Of morphin Paulin had none, now. He had put all he possessed into the vegetable ferment, like beer leavening, that was at work in the jar on the shelf. The result was a product possessing not one of the chemical reactions supposed to be characteristic of morphin, but retaining its narcotic qualities. He had some of this new preparation in a form suitable for hypodermic injection, and had experimented with it as a local anæsthesia.

The emergency was pressing. Taking enough of the new preparation to make three or four injections, he accompanied the husband back to the doctor at the patient's bedside. After a hasty consultation together, doctor and chemist risked an injection.

For some five or seven minutes the agony was unabated. Then the remarkable virtue of the new drug began to show itself. At the end of a quarter-hour the pain had gone as by a miracle but the birth was progressing uninterrupted. A few hours later the child was born, painlessly.

Doctor and chemist withdrew as the sun rose on that ecstatic household; both practitioner and analyst were

dazed, incredulous; yet both had seen, and both knew that the fact established was a revolutionary one in obstetrics. Morphin had been used in a form that had proved harmless to the mother and child, and had produced total immunity from pain, allowing the birth to progress normally. It had accomplished a scientific miracle.

If either of these men had heard of the Freiburg method of painless childbirth, they had years ago discounted it, and classed it with those French experiments in chloral, chloroform, opium and morphin which failed. So to them the miracle at which they had assisted was the first truly painless birth in which the muscular action had not been inhibited, nor the birth retarded. And they named the new drug after the miracle: Tocanalgine, Painless Birth. Later the name was changed to Antalgésine obstetrique.

The doctor, in sending for morphin, had expected to use it in infinitely small doses to give sleep momentarily, between pains. For to have used simple morphin in an amount sufficient to produce analgesia would have been to endanger both mother and child. This fermented morphin had produced analgesia without toxic effects, for it had what afterwards proved to be but one-fifteenth of the toxicity of morphin alone.

For days afterwards, doctor and chemist talked about it; the neighbours talked about it. It seemed as if one of the great fundamental laws of nature had been set to one side. It would revolutionise obstetrics. Meanwhile, another hard birth coming along in his practice, as these cases seem to run in groups, the doctor used the new drug

again, and again had the miracle of painless birth unattended by unpleasant after-effects.

Paulin began to be on the lookout for cases in which women could be persuaded to seek the relief of the strange drug. The cases were few in a little French village where prejudice is deeply rooted against the new and strange. It had indeed worked for this one and that one, who proudly exhibited their glowing babies; but might it not fail to work in the next case? Both doctor and chemist dreaded that next case, hypothetic though it might be: the case in which a still-born baby, dead perhaps two days before the drug was injected, would be laid at the door of the drug. Still, as it became known that the chemist, who was much respected and looked up to by the village, would personally bear the expense of one's confinement if one consented to be delivered under the painless drug, a number of patients came forward who would otherwise have contented themselves with the doubtful sepsis of the village midwife.

Paulin considered his resources, and fitted up a small hospital, or lying-in home, to which patients could come and have their confinement as free as in the maternity hospitals. For this small private hospital, it was his idea that he could employ the highest obstetrical talent in Paris, thereby introducing to them the drug which, under the expressive name of Tocanalgine, he was offering to them in sample packages.

The obstetrical talent of Paris, in the persons of one or two of its exponents, came when summoned, for the actual delivery alone, and scoffing at the analgesia that they were at no pains to observe through the period of labour,

refused to take any interest with what they probably set down as a novel form of chemical advertising.

Paulin found himself paying Champs Élysées fees for the confinements, in his private hospital, of his charity patients, without there being roused in the minds of the fashionable practitioners an idea that there was anything, scientific or otherwise, to be investigated in this unusual experiment. The hospital conformed to the city requirements; beyond that it might have been the harmless fad of a man of means gone daft on a fixed idea. They still refused to have any responsibility for Antalgésine; it was still impossible to introduce it experimentally into any of the great maternity hospitals.

Two years of apparently futile effort passed in this way. They were not entirely futile, for Paulin the chemist was very nearly qualified to pass an examination as Paulin the obstetrician, so closely had he studied the cases under his drug, and so minutely had he kept records of its singular influence, during the birth process. The country practitioner who had watched through the first case with him had remained an interested observer of Paulin's efforts to get the drug before the influential men of Paris. He now offered to personally take Paulin and present him to Ribemont-Dessaignes.

"He will laugh at us," he explained, showing that he had been intimidated somewhat by Ribemont's levity, "but if he says he will try it, you can rest easy that he'll give it a perfectly fair try-out."

"I did laugh," Prof. Ribemont acknowledges. "But I listened, too. I looked over the informal reports Paulin had ready to show me. I promised to give the stuff a try-

out, not simply at Paulin's hospital, but at the Beaujon Maternity. I personally administered the drug in the way practised in Paulin's hospital, and at once became absorbed in observing its influence. I instantly appreciated that I had to do with a discovery.

"On the day when I made my own first experiment with it, I invited both Dr. Laurent and Dr. Paulin to be present.

"There were three parturient women in the ward at the Beaujon Maternity. Two were having their first child. The third was already a mother of several. All three, as I will show you presently, were having a very hard time of it. Their agitation and their energetic cries testified to the intensity of their pains.

"Approaching Number 1, I offered to assuage her suffering, but was not at all cordially received. 'I am not so anxious to die,' she declared.

"The second refused less brusquely; nevertheless, she refused.

"The third one—you'll remember, the mother of many—accepted at once, and I injected into her one cubic centimetre of the solution. Up to this time the labour had showed itself to be very regular, and the contractions very severe, coming back every five minutes. Exactly five minutes after the injection the contraction came, accompanied by a pain which seemed of shorter duration than the preceding ones. Another five minutes passed and a new contraction came, this time noticeably less painful. Five minutes later, the uterus contracted again, but unaccompanied by pain. I was, I admit, very much impressed.

"Tremendously impressed, also, were the occupants of

the other two beds. These women had not missed a word as to her lessened pain that Number 3 furnished, and at the end of a few minutes, Number 2 requested that I give her the injection that had so miraculously relieved Number 3. I made the injection, and saw her experience, first, a shortening of the duration of the pain, then a lessening of its intensity, and finally, its entire abolition at the end of 15 minutes.

"Number 1, now quite reassured that it would not kill her, screamed lustily to be relieved in the same marvellous way; and without holding her previous prejudices against her, I gave her the injection, and soon, like her neighbours, she was free from pain.

"In the ward, which up to now had been filled with screams, there reigned an imposing silence.

"I went from one to another, and noticed not without astonishment that the rhythm of the uterine contractions seemed not to be noticeably modified. Labour continued regularly and painlessly in all three women.

"The first one was delivered a few hours later without suffering. The second one, in whom the pelvis was very narrow, and whose child showed a forehead presentation, had to be delivered in the evening by the aid of forceps; the mother of many, whose child had been dead for four days, had to be delivered in the same way. They had been spared untold suffering.

"In my subsequent experiments I used the drug wherever the labour seemed very painful, or the birth promised to be very long. Now, I use it in almost all my cases; in all, in fact, that do not refuse it.

"The drug acts on the nerve centres, on the brain and

sympathetic nerve, and is carried from the point of injection to the nervous centres by the circulatory system.

"A certain number of women arrive at the hospital in an advanced stage of labour; in these the analgesia prolongs itself beyond the duration of the confinement. With this reservation, the average of the duration of analgesia in women who required but a single injection—of which we had 63 in our first group of 112 cases, or more than half—has been seven hours. In 39, the contractions became painful again at the end of five hours, on the average; they then received a second injection, thanks to which the labour terminated without pain. In 9 cases, it was found that after an analgesia that was more or less durable, it was necessary to give a third injection."

This is the picturesque story of the first administration of antalgésine at the Beaujon Maternity, and the very general statement of its gradual adoption through the service. Since these first experiments its use has spread to all the other maternity hospitals of Paris, and has been welcomed by such an illustrious colleague of Ribemont-Dessaignes as Pinard. The experience in the drug in the various hospitals now covers many hundreds of cases and, after the war, there will probably be many reports on it. What they will bring out remains to be seen.

Antalgésine is still in its experimental state. There is no report published except that of Ribemont-Dessaignes, and a first part of a carefully analysed report on later cases by Dr. Le Laurier, who was called to the war before part two and part three, which were to contain the important facts of his experience, were ready for the press.

Pinard makes a short statement, noting, like Ribemont himself, a small percentage of refractory patients. He notes a greater variableness of effect than the others both in respect to state of consciousness attained in different patients and to the duration of painlessness from one dose. Others note a longer passage of time before the drug produces painlessness. Still others note a difference in characteristics when the drug has aged. Pinard's report shows that the characteristics are not yet fully studied, but he is, like the others, enthusiastic about the value of painlessness, and the promise of the particular drug. Pinard is also the one who speaks most emphatically on its harmlessness, and even what he considers its decided advantages to the child during the birth process, and the entire absence of prejudicial after-effect.

Gauss of Freiburg passed through the period of alarm over the oligopnœic baby who came sleepy into the world; later, he considered it of little importance; later still, he began to feel that the sleepy child had in some cases a safeguard against one of the common dangers of the birth process: that of breathing prematurely and inhaling injurious fluids into the bronchial tubes.

Pinard of Paris does not throw this out as a suggestion. He confidently enumerates this oligopnœic condition among the advantages of the use of antalgésine. "It seems likely," says he, "that this influence may be of great value in cases where premature respiration is to be feared."

Ribemont-Dessaignes goes farther. He establishes by experimentation this positive value of painlessness in some cases suggested tentatively by Krönig and Gauss, and proclaimed without question by Pinard. "These children,"

Ribemont-Dessaignes declares, "who have never felt the need of breathing before birth, have their respiratory passages free from all foreign obstruction. This is much more marked in the case of those who by reason of umbilical cord entanglement, low implantation of the placenta, breech extraction, and narrow pelvis, etc., are born in a true state of apparent death; in these aspiration drew out neither amniotic fluid, nor mucous substances, nor meconium. The drowsiness of the fœtus made it unsusceptible to the need for premature respiration. I saw four of these cases."

An American obstetrician in whose hospital service Twilight Sleep was being tried obtained a few sample ampoules of antalgésine, and turned them over to his chief of staff, who was able to use it on three cases. In his brief summary of these cases before the Obstetrical Division of the Academy of Medicine, he said:

"Though my three cases with antalgésine were not everything to be desired I assure you they were much more successful and more encouraging than were my first attempts in the Krönig-Gauss method."

This exactly bears out Prof. Ribemont-Dessaignes's claim for antalgésine "for the provinces": it is easier to use with relative success.

In concluding a brief report this American physician says:

"In comparing scopolamin-morphin and antalgésine, certain points should be taken into account: Both act on the central nervous system. Antalgésine works in fifteen minutes; scopolamin in from one to three hours. Both fail in a small percentage of cases. Both are harmless

to the mother. Both probably prolong the second stage of labour, but a slight prolongation is rather a benefit than a harm. Both cause oligopnœa in a certain number of cases; in my antalgésine cases two out of the three were oligopnœic; Ribemont's experience is 25 per cent. of oligopnœa—a larger proportion than in any series of confinements under Twilight Sleep, but Professor Ribemont-Dessaignes notes this peculiarity: where he has used antalgésine that has been over six months aging, oligopnœa has not been observed.

"Though I am delighted with the results I have obtained with Twilight Sleep, I would welcome a drug that was just as safe for mother and child as scopolamin-morphin, and easier of manipulation. In the Freiburg method, the memory test, not always easy to employ, must be repeated every few minutes, and the mother and child must be constantly watched. With antalgésine, the return of the objective signs of pain means that the effect of the drug has worn off, and the patient needs another injection; the first dose can be given near the end of labour as it works promptly and its action is not impeded by pain."

These conclusions, though based on too few cases to assume authority—for three cases, or 112 cases, is too few to carry conviction—suggest to advocates of painless birth both the strength and the weakness of antalgésine if it fulfils its promises. However optimistically Ribemont-Dessaignes may look at it, the proportion of oligopnœa is too large. Maybe the percentage will be lessened progressively as it has been with Twilight Sleep.

Obstetricians in America have been amazed at the instructiveness of Dämmerschlaf. As one of them said re-

PROFESSOR WEISMANN'S GREAT-GRANDCHILD, born under Dämmerschlaf in 1913. Professor Weismann was the contemporary of Darwin. He was emeritus professor of biology at the University of Baden, and died at Freiburg in 1914.

CONCLUSION

The Obstetrics of To-morrow

"This may be called the gentle age of obstetrics," said A. Lapthorne Smith before the American Gynecological Society in 1911. "Brute force and roughness have been replaced by wise judgment and gentle skill."

The age may be gentle when compared with that of Laurence Sterne, but that much of the obstetrics is still as primitive as those described in *Tristram Shandy* is an incontestable fact. In a talk before the Twilight Sleep Association Miss Fola La Follette described a confinement which was in the hands of a general practitioner. The case required cæsarean operation. The general practitioner had not had the knowledge to diagnose it. He let the birth progress to an acute stage, and then suddenly the situation was taken out of his hands; needed the specialist; and he was obliged to call an ambulance, and putting the patient into it, jolt her in her agony and extremity to the nearest hospital where there was a surgeon competent to perform the cæsarean section.

Only in time of accident or war would a man be subjected to such medical care as this. Yet the "wise judgment and gentle skill" of the general practitioner, who is always considered adequate for confinements, are never able to cope with such emergencies as this; and childbirth is distinctive for its sudden and vital emergencies.

Dr. A. B. Davis, Professor of Obstetrics of the University of Pennsylvania, gives us an idea of how common such situations are in private practice:

"We are positive that many lives of mothers and infants are lost each year and many others are left more or less permanently physical wrecks who could have been saved by the timely employment of cæsarean section."

Fifty years ago, the surgeon was despised. He was regarded as a degree below the general practitioner. He was generally the barber, and the barber's pole still has the streak of blood wound about it.

The general practitioner clings to his births for the small fee they bring in, but he dislikes them for the time they take and for the emergencies that may arise in them. There have come into existence two other classes of medical men: the obstetrician who specialises in births, and the gynæcologist, whose main function is to repair the damages done by the general practitioner in conducting a birth. Dr. J. O. Polak puts at fifty per cent. of all gynæcology the amount of it which is due to badly conducted births.

The obstetrician, better equipped to learn from his own experience, has an opportunity which never comes to the general practitioner with his occasional births in his practice, but he suffers from some of the contempt that the surgeon suffered from when surgery was becoming a science. In medical schools the professor of midwifery is looked upon by his colleagues as being engaged in an almost unworthy pursuit. The professor of gynæcology, who has the care of a woman in all the pathological phases of her sexual life, generally considers the bringing of a

normal life into the world, that is, pure obstetrics, beneath him.

The professor of obstetrics, midway between the general practitioner and the gynæcologist, is not himself equipped to meet all the emergencies of a birth or of morbidity following a birth.

Many childbearing women to-day are brought ultimately into the hands of the gynæcologist through the incomplete equipment of the men who have brought the children into the world. They are sufferers for the limitations of their present-day obstetrics. By raising the obstetrician to the grade of the fully equipped gynæcologist and by equipping the gynæcologist as thoroughly for obstetrics as he is now equipped for gynæcology, the fifty per cent. of gynæcology which is at present attributed to bad obstetrics may be done away with.

"Neither gynæcology nor obstetrics," says J. Whitridge Williams, of the Woman's Hospital, Baltimore, "will take a proper place until a body of men has been developed who will be interested in, and devote themselves to, the study of the problems connected with the entire sexual life of women. I hope to live to see the day when the term obstetrician will have disappeared and when all teachers will unite in fostering a broader gynæcology instead of being divided as at present into knife-loving gynæcologists and narrow-minded obstetricians who are frequently little more than man midwives."

With anæsthesia and the modern hospital the barber-surgeon has disappeared. With obstetrical anæsthesia and the perfectly equipped Twilight Sleep hospital the man midwife should disappear also, and the gynæcologist-

obstetrician be the equal of the surgeon. In the future he may be considered his superior, since the expert bringing of life into the world is part of preventive medicine while surgery is only repairing. One represents the way in which we are meeting, and trying to humanise morbidity and death; the other should represent the way we meet life and the prevention of morbidity.

"We educate the public," says Dr. Polak, "how to prevent disease. It is going to educate us how to prevent many of the disasters of childbirth by insisting on better antepartum and interpartum care."

The death-rate in all civilised countries is smaller than the birth-rate; the suffering at birth is, therefore, greater in volume than the suffering at death.

Part of the mortality rate and the morbidity rate of the world is caused by injuries to mother or child at birth. Dr. E. Gustav Zinke, a recent president of the American Obstetric Society, not long ago made the statement that in the face of the progress of scientific medicine, except for those cases cared for in the hospitals, the maternal and fœtal mortality and morbidity from childbirth has not diminished in the last twenty years, and this is borne out by figures gathered by Dr. Ellice McDonald.

The form of obstetrical anæsthesia which brings the mother and child under the expert care of the perfectly staffed and equipped hospital is the one hundred per cent. perfect method of the future.

"We have reached an age," says C. Foulkrod, Obstetrician of Jefferson Medical College, "when to accomplish any purpose it requires more than the feeble cry of one or two men on one night in a meeting to produce results. We must dignify the idea with the

volume of a movement, we must back it by publicity, we must sting the doctor through his patients' brains to greater expertness or to an awakening that such a movement is abroad.

"A day will come when all our babies will be born in hospitals. Enough hospitals for the purpose would cost less than our filter plants against typhoid.

"In any maternity case the apparently simple and normal may be in the fraction of a second changed to the most serious.

"We have reached the time after years of waiting when the delivery of a baby is conceded to be a surgical operation. This society should take up a crusade to have such surgical operations performed in hospitals, where they belong."

Scientific surgery and the splendid modern hospital have grown together out of the humane practice of anæsthesia, and expensive as surgery is, it is practised in the same way in the free wards as in the private ones; the operating room and the conditions of operations are identical.

The humane practice of Dämmerschlaf will raise obstetrics also to a costly science. Dr. Birchmore hails the "hyoscin sleep" as that form of painlessness on which that great improvement of the obstetric art for which we have all been looking can be grounded.

A new view of the value of life will be fostered. To-day the sense of its cheapness is so strong as even to stupefy society into habitual phlegmatic acceptance of its pain.

Birth is reckoned by the average family at a cost of $25. The same family, confronted by the need of an operation, goes to the free or the cheap wards of the hospital, where the difference between the large expense of highly specialised work and what that family can pay is met by the community.

The safeguarding of childbirth is even more the con-

cern of the community, and would cost no more, as Dr. Foulkrod has estimated, than the now awakened community feels justified in paying towards the prevention of a single disease.

The life of the child is now reckoned at this $25 valuation, and the result is a devastating stream of cheap life. The humanising of birth, and the raising of its valuation to an average of the estimate of a maternity hospital, $85, for a birth will not make life commoner. The child's life and the mother's will be held less cheaply, and will be of more worth, in consequence, to the community.

Krönig gave two messages to the women of Freiburg. For the first, the elimination of pain from childbirth, the women of Freiburg were ready. For the second, the women of Freiburg were not quite ready, but the gynæcologists of Germany were agreed at their last meeting when they resolved that for the sake of the mother their association should stand for family limitation. They preferred fewer lives better born and better nurtured to many cheaply born and cheaply nurtured.

The message of Gauss is to the profession. Eight years ago they took it, and acted upon it, in bad faith. To-day, taught by the women who kept faith with Krönig, the profession now says: "How strange it is that the Gauss technique has lain idle in medical literature with no one taking advantage of it."

Simpson's message was never placed before the women of his day and has lived only in the practice of the very few most hypersensitive and sympathetic of his profession.

The women who went to Freiburg, and women who will never go to Freiburg, look upon the little Frauenklinik

in the metropolis of the Black Forest as their promised land.

One American obstetrician, whose plan for a central hospital with a chain of small obstetric hospitals all over the country working in close touch with it, is the most comprehensive for meeting the new demand for painless birth and better obstetrics, says:

"It will become necessary to establish local hospitals where the physician may send his patient to have the Twilight method administered by a nurse or physician trained in this method. When the time of delivery approaches the physician may be notified so that he may deliver the child in the hospital. This seems to me the practical solution of the problem of how the large mass of the population are to receive the benefit of Twilight Sleep; for, of course, it becomes impossible for a man with an active general practice to give the uninterrupted attention to his obstetric cases that the Twilight method demands; and unless continued observation of the patient in Twilight Sleep is carried out by some one accustomed to the technique, it is better not to attempt the method at all."

This is an expensive demand; it means the reorganisation and the raising of obstetrics.

Its outcome will be painless spontaneous birth on as universal a basis as painless surgery. Its final outcome will be to relieve one-half of humanity from its antique burden of a suffering which the other half of humanity has never understood.

It is only since they have heard the promise of the Twilight Sleep that the burdened half of humanity have themselves begun to express articulately the underlying tragedy of maternity.

HOW IT FEELS TO TAKE THE TWILIGHT SLEEP

HOW IT FEELS TO TAKE THE TWILIGHT SLEEP

I

The Freiburg Experience of

Mrs. Cecil Stewart

When I first decided to go to Freiburg to have my baby, I did not believe I would have a really painless child.

We had been able to get so very few facts about Twilight Sleep and about Freiburg, for we were in America, and Mrs. Emmet, the only one who knew about it, was in Europe. To all our queries, she wrote back, "The Head Nurse will tell you everything."

My sister and I reached Freiburg after a long, tiring journey. We had come from London where I had been so ill that I had contemplated staying there for my baby, although I had come from America to have the Freiburg Dämmerschlaf. The doctor in London seemed to think there was no necessity for rushing to Freiburg for this Twilight Sleep. He said he could give it to me himself, in London. But he warned me that it would be very expensive, while at the same time he treated it rather lightly, and I was more than ever determined to go to

Freiburg where it would be administered with enthusiasm if at all. So, as I was decided to go on to Freiburg, he gave me a letter to Krönig, assuring me that I would like his German confrère.

We got to Freiburg the middle of a cold, wet, dismal October night. I was so ill and tired and lonely that I made up my mind to go right back to England the next day. But when the next day came, the people in the hotel were so kind to me, and so sympathetic, that I began to get used to my surroundings. I was too sick, however, to leave my bed, and I stayed in it for a week.

I had mailed my English doctor's letter of introduction to Prof. Krönig, and I wondered as the days passed and he did not come to see me. Then one evening the head nurse came. It was as Mrs. Emmet had said. She answered all our questions, but she also said that I should have to go to Prof. Krönig, as he could not come to me. I was not, however, fully persuaded to go to the klinik. So a few evenings later the door opened and one of the younger doctors of the klinik, Dr. Schlimpert, came in. He did not bother me with questions, nor ask me when I thought the baby would come, nor how I felt, nor any of the disagreeable things doctors usually say to one in these circumstances. He just came over to my bed, and took my hand, and said, "I have come to comfort you." Two such friendly personalities as those of the head nurse and this young assistant made the klinik less formidable, and I readily acquiesced when he asked me to go to see Prof. Krönig the very next day.

My sister and I went up to the klinik and were ushered into Krönig's room. After he had examined me, he said

that I must come to the klinik that very night, as I was to have a breech baby and he did not trust the taxi service to bring me to the klinik in time if the baby started to come in the middle of the night. I protested, and said I would not think of coming to the klinik, as I felt sure I would have oceans of time to get there. I had had one baby before, and knew how long it was from the first pain to the baby's arrival. He threw up his hands and called to the head nurse to reason with me. "These American women are terrible," he cried. "They always want their own way. *You* talk to her."

The head nurse led me off and suggested that I simply sleep at the klinik at night, and go back to the hotel in the daytime. I said that if I might have my sister in the same room with me, I would.

The private rooms were all full, and the head nurse said that we should be obliged to sleep in one of the confinement rooms and she was afraid I might be nervous; some women were. She showed us the room. We were absolutely charmed with it. It was big and high-ceilinged, with beautiful white tiles, and surrounded along two walls by sterilisers and all the paraphernalia of a confinement. There was the little twilight lamp, there were great ceiling lights and lights that could be put on at the bed-foot. There was also a fluffy baby's crib with curtains, and a baby's tub.

We came back that night about nine o'clock after we had had supper at the hotel. We expected there would be a whole staff to meet us. But instead of that we let ourselves into the klinik, and into our own room, and our own beds. No one came near us. We stayed there every

night for three weeks, and the only member of the staff we saw was the head nurse, who brought new babies in to call on us before we were up in the morning, and after we had gone to our room at night.

One day I got discouraged. My sister said that the only way to bring the baby was to order two horses to the carriage and take the long drive up Bromberg round the Lorettoberg and back by way of the Schlossberg. So we ordered the two white horses.

That night, at about ten o'clock, I went to bed feeling rather tired. At midnight I was wakened by a very sharp pain. I sat up in bed and rang the bell. The head nurse came and I said, "Schwester, I have a very bad pain." And she went away and came back with a hypodermic and gave me an injection of scopolamin-morphin. Then my sister was moved into the adjoining confinement room, which was unoccupied, and my room was got ready for the birth. Then I had a second injection. I began to feel thirsty and drowsy. And then Dr. Gauss came and examined me. I said, "I have an awfully bad pain."

He said, "Yes, you *have* a very bad pain." And, oh, I was *so* happy when I heard him say that. It was the first time a doctor had ever admitted that I had a bad pain when I had one. Before, they had always known better than I had, and they had told me, "Oh, no, you have not got any pain at all; *that* is *nothing;* you'll have to have much worse pains than that." Just Dr. Gauss's admitting that my pain *was* pain made me feel comforted and happy. I felt at last I had found a place where people realised that pain was pain, even if one did not run round the room and scream; and they were going to try

to make me comfortable and happy, and give me as painless a baby as possible; because even then, I didn't believe I could have a painless child. I thought I was merely going to have one that was not so painful as the last one had been.

I woke up the next morning about half-past seven. I could not see very well, because my pupils were dilated by the scopolamin; but in a vague sort of way I felt there were three chambermaids in the room, and they were washing the floors and the furniture, and making a fearful racket. I thought, "This is a nice way to leave me alone like this; I might have the baby any minute, and not a doctor or nurse that I can talk to!" Because all these strange women spoke in dialect. And just as I was thinking this, and really getting rather worked up over it, the door opened, and the head nurse brought in my baby.

I sat right up in bed, and cried, "I can't believe it; it is a fairy tale! It isn't *true!*"

She said, "Yes, it's true"; and I was so happy and so pleased, and I sat up in bed and had a wonderful breakfast. At ten I had a glass of milk and some biscuits; at eleven the white horses came round, and we sent them away with many lumps of sugar. At one o'clock I had lunch: a real German lunch, with soup, and an omelet, and boiled beef and cabbage, and potatoes, and roast hare, and carrots and peas, and a salad and dessert. I could hardly believe that I could have all those things to eat; but I had, and I ate them. I was terribly hungry and felt terribly well.

Then at four o'clock I was moved to my own room in the private ward, and I had my sister in this room too.

There were two white beds, one on each side of the room. It was a beautiful big room, not as big as the confinement room, but big compared to hospital rooms here. And there was a beautiful view of the mountains; and the room was mostly all windows, which made it very light and full of sunshine; and there were fresh curtains at the windows, and the furniture was white and simple, and it looked like a beautiful room in a big hotel.

I stayed there nearly a month, as I was taking the baths. I got to like it so much that I hated to leave.

The second day after the baby was born, I got up and walked round my room, and washed my teeth. I can't explain how happy it made me to get up and wash my teeth, because I always hate having things done in bed, such as washing teeth and having my face washed. Then, the third day, I got up and sat up for an hour or two, and the fourth day I sat up all afternoon, and the fifth day I went out for a drive; and all the time I felt perfectly well and happy and did not have anything the matter with me at all. And I felt that a great deal of it was due to the fact that such wonderful care was taken of me by the doctors. Here in America, with my first baby, it seemed to me that I had always been sacrificed to that baby. I had to wake up in the middle of the night to feed it; I had to wake up early in the morning and late at night when I was tired. But here in Freiburg, between the hours of ten o'clock at night and ten in the morning, you never saw your baby. It was taken away and put in the nursery with the other babies, and you had a beautiful, long, nice sleep; and if the baby needed to be fed in the middle of the night it was fed by a wet nurse, or by some-

"The second day after the baby was born I got up——" From a snapshot taken by Marguerite Tracy in the Frauenklinik, showing MRS. STEWART out of bed on the second day.

Courtesy Miss Alice Boughton

"SUMNER," the little son of Mrs. Mark Boyd, born at Freiburg in January, 1914. Mrs. Boyd turned an interrruption in the course of work into an opportunity for intensive work of a special kind.

one else in the hospital, or with a bottle of mother's milk that had been gotten. And then, at ten in the morning, the baby would be brought to you all nicely dressed and washed and clean; but if it cried or annoyed you, it was taken out in the daytime, too, so that you always had your nerves at rest, and were never disturbed by the baby's crying, or anything. In that way I got well much faster, because I had sleep, and always rested, and never fretted about the baby or worried over it; so that really, by the fifth day, I felt twice as well as I had when my first baby was six weeks old.

Then, at the end of the tenth day, I began to take the baths prescribed for you in the klinik. These baths Dr. Krönig calls beauty baths, because they are supposed to bring back your original figure. You take them three times a week, for as long as you need them. I enjoyed them very much, and think they did me a lot of good.

By the time the baby was a month old, my husband began to get impatient and cabled me to come home, so my sister and I started back for Paris, very reluctant to leave Freiburg and all the kind people. And when the baby was six weeks old, I sailed for America, still marvelling that I had really had a painless child.

II

Mrs. Mark Boyd's Story

(Reprinted here by courtesy of "The Ladies' World")

I came to Freiburg in the winter of 1913. Both Mrs. Emmet, whose first coming to Freiburg was purely accident, and Mrs. Stewart, who came at her recommendation, accompanied by her sister, Marguerite Tracy, were my personal friends. Mrs. Stewart was willing to make an experiment which had resulted so favourably for Mrs. Emmet. Miss Tracy was anxious to observe such a phenomenon as a completely painless childbirth at first hand. When I left New York for Freiburg, Mrs. Stewart's Twilight Sleep baby was already a year old, and as good a testimony as I needed to the harmlessness of Dämmerschlaf.

During this year we had all three of us written to the klinik repeatedly for specific information and printed matter, and had been able to get no response, except as regarded reservation of rooms for definite patients. The klinik and its methods were still only known from one patient to another, and locally. Scientifically, it had been the centre of professional controversy, but of that we knew nothing.

I therefore determined to use my own experience as the

basis of a definite statement to be as widely circulated as possible, as it would have the value of what the historians call a primary source, or the scientists a laboratory experiment.

Miss Tracy was to meet me at Freiburg, and we felt sure that in a week or so we could supplement the points essential to a clear presentation to any woman who had any experience of childbirth.

We believed that medical etiquette would be waived for a matter of such social value. It was not, and the few weeks that we had expected to spend on preparation lengthened into months. The doctors, kind and sympathetic as friends, evaded us wherever we threatened their "professional morality." It became a question of making friends amongst the Frauenklinik mothers in Freiburg, and amongst the professors in other departments of the University of Baden, who could not do too much to endorse the work of the two doctors, and who directed us to the German scientific sources.

On the literature of Dämmerschlaf in medical journals we worked until my confinement. The confinement itself gave me an insight which no amount of literature could have furnished, both in experience and in observation.

My social interest in the Dämmerschlaf was supplemented by the chance which it seemed to offer to a professional woman who, like myself, could use the material; thus turning what would have been an interruption in the course of work into an opportunity for intensive work of a special kind.

Secure in the experience of my two friends, I did not look forward to any ordeal, but simply to an interesting

event. My mind has never been freer, clearer or more active than during that nine months.

I left America cheerfully on the sixth month, not at all apprehensive of being away from my family and among strangers speaking a strange tongue. I had absorbed from my friends their sense that "in Freiburg you are safe," and this conviction was strengthened when I actually arrived.

My hour finally came in the dark of a midwinter morning. As the taxicab rolled quietly along, its headlights the only lights burning in the most death-like hour of a winter day, I did not even feel the depression that comes from the dead cold of that hour. I was tremendously interested and a little excited. Indeed, after the nine months, it seemed more than I could grasp or hope for that pregnancy was now really over.

I caught only the lower outlines of the familiar bridge over the Dreisam River, which runs through the city as one of its most prized ornaments; then the old city gate in Martin's Tor enclosed the taxi. Then on through the city along Kaiserstrasse to Albertstrasse, where the medical schools are grouped, and the car turned in to the Frauenklinik.

The greeting of the nurse, who never sleeps and never looks as if she needed sleep, under the lighted doorway of the klinik, was hospitable and most reassuring. I went to bed in the blue confinement room, because blue is for a boy, and I wanted a boy. Until afternoon there was little progress, but by four o'clock the pains were regular. I did not at once ask for my first injection of scopolamin, as I was unduly anxious about interrupting the labour.

But at six o'clock the head nurse, allowing for American stoicism, persuaded me to ask for the first injection, which I did.

For an hour the pains were about the same, and at the end of that time I had a second injection. I was tired out with pain, which I had suffered unnecessarily for two hours, and dropped dead asleep.

It was dark by that time. The double padded doors of my room were closed. No one was inside with me but the oberschwester, and there was no light but the little green-shaded Dämmerschlaf lamp. There was the perfect peace that is necessary to induce clouded consciousness.

Several hours later I woke up. The Dämmerschlaf lamp was still lighted, and there was a midwife in the room sitting apparently waiting at the foot of the bed. The head nurse was moving around silently, and I could see her, and everything else, triple, in a sort of mist, far off. It was like waking from a coma. I was frightened in a dreamy way, as if I were in a vault, alive, but put away like the dead. I never shall forget this strange impression. It was a momentary experience in real life of the impossible such as Poe wrote about.

But the fact that, after a minute, really frightened me and filled me with despair was that the pains had stopped. I had a curious crafty feeling that if I kept my own counsel and let nobody know, I might fall off again into the real Twilight Sleep, a sleep not too heavy for the pains to progress. So I kept my numbed hands crossed, and only watched the comings and goings—more like floating they seemed to me—through half-closed lids. But it did no good. I could not drop off. Presently the head nurse

came to the bed and caught me awake, and asked me how I felt. I looked at her solemnly. "Even the pains have stopped," I said. "I did take the scopolamin too soon." She laughed, stepped over to a table alongside the wall and brought me my baby.

With all my preliminary studies of reports on Dämmerschlaf—and I had studied everything I could find about Twilight Sleep—I had been cheated as any of the simple-minded nine women out of ten are. I had wakened from a ten-hour labour believing that I had been caught napping and the labour was still before me. All through the night—it was six o'clock in the morning when I woke—while my brain was sleeping, my muscles and nerves had been working and I had brought forth the baby from beginning to end of labour by my own efforts. Outside the room, my friend, Marguerite Tracy, had followed my progress. Inside, two doctors and three midwives had been with me. Towards the end I had lain masked under the calcium lights. I had whimpered occasionally, spoken ramblingly from time to time, and step by step I had followed the doctors' directions when difficulties arose, and they told me to give some strong pushes. For sleeping to all other ideas as the thinking brain is in Dämmerschlaf, it is always for some unexplained reason awake to those connected with the work on hand. It was Miss Tracy outside my door who first suggested to the head nurse that I was biddable and could be made to work harder.

The head nurse also asked her, laughing, where she had put my temperature. She had just asked me, five minutes after taking the thermometer from me, whether she had taken my temperature, and I had replied fretfully,

"Daisy took it into the hall ages ago and she hasn't brought it back." Thus unconsciously I furnished a model irrelevant answer to the memory test on which the perfect Dämmerschlaf depends.

On the whole, they said, I was unusually quiet and very sensitive to suggestion. At one point the younger doctor in charge of the sleep advised the forceps, as I was obstetrically old and stiff and structurally small. But Professor Krönig found the child in no danger, and let my "good American muscles" take their time. His longer experience of what can be done—or left undone—in Dämmerschlaf, illustrated very well the value of experience in using the method to perfection.

The baby that the nurse put into my arms when I woke, done up in an oblong German bundle like a papoose, was also loud and lusty and ruddy like a papoose. I do not know whether he was born "short of breath" for a few moments as some scopolamin-morphin babies are. I knew beforehand, on no less a testimony than that of one of the chief of the early opponents of Dämmerschlaf, that with careful use of the combined drug, this condition was a more or less imaginary danger, which alarms only the inexperienced administrator. I saw now when I held him in my arms in what a brisk and lively condition he had wakened from his doze, even if he had had one. The baby has never shown a tendency to be overdrowsy since. At first he was almost too alert. But of late he has developed into a little bronze Buddha, with his brains all gone to stomach, as uninteresting and healthy babies should.

This birth I have said was accomplished spontaneously, with no laceration, no exhaustion, no operative or other

assistance. I had many of the structural defects that call ordinarily for the use of the forceps, or a long painful, waiting process. I had seen my sister at the same age and structure as myself forced to "wait," as the obstetricians call it, for twenty-four hours of real labour pains, and I had seen her an invalid for several months after the birth. This was what waiting in consciousness meant. Taking my leisure at the labour in Dämmerschlaf, and, thus preventing not only the use of the forceps, but preventing also laceration at the end, meant no exhaustion and no necessity to recover from what had been made as birth should be, a healthy physical exertion.

My recovery was a rest, a rest indeed under constraint, because I wanted to be up and about. From scopolamin-morphin I had distended pupils and numb fingers for a day or so; a thirst and a slight sweat the first night. From the birth I naturally had stretched muscles to restore, and this I did by the bed exercises, urged by the klinik, night and morning, which are kept up for a month or more. They are like the Swedish exercises of the legs and abdomen, and are excellent to restore the lower part of the figure to the normal. Just after the exertion of labour the exercises are easy, but if the patient is irregular with them, later on, and allows her muscles to become flabby, she gets a realising sense of the fact that immediately after the birth the muscles exerted in birth are in better condition than after a period of inertia.

I was up for half an hour a few hours after the birth. I took a motor drive on the fourth day and left the klinik after ten days' rest. The night of my confinement will always be a night dropped out of my life.

"Birth is but a sleep and a forgetting," says Wordsworth of the life of the infant's soul before birth. And so it is of the infant's part in the birth process. He is in the ideal condition of natural amnesia. He labours, he struggles, he goes through all those hazards and dangers of birth that makes one great American obstetrician call it "a conflict unto death between mother and child." But the baby forgets each detail as soon as it happens and he comes out without knowledge of what he has been through.

A prick of the needle at the apex of a pain, and birth can mean the same thing to the mother also; and she, too, can do her part as efficiently as the painless child has always done his. Her equipment for her task will not be as it is now, inferior to her infant's.

III

Mrs. Francis Carmody's Story

(Reprinted here by courtesy of "The Ladies' World")

Note: Mrs. Carmody was the first woman to go to Freiburg directly in response to the Painless Childbirth propaganda begun in *McClure's Magazine*. She telephoned her physician and received his hearty endorsement of the Freiburg Frauenklinik doctors. Later, her physician visited her in the klinik at Freiburg. The Freiburg method is now the routine method of painless birth at his hospital.

"I came to the klinik at about five o'clock, and was put to bed in the birth-room; about six o'clock I received the scopolamin injection.

"The next thing I knew I woke up. I just sat right up in bed and looked at the clock.

"It was seven o'clock and I realised the night had passed.

"'Well,' I thought, 'I must get dressed and go back to the pension. Perhaps the baby will come to-morrow.'

"Then I noticed that I felt lighter, and sat up easily, and my figure had changed.

"I must have awakened before they expected me to, for I was all alone in the room. Luckily for me, at that moment the nurse came in—I was terribly excited.

"'Baby!' I said. 'Baby!'

"'Yah,' said the nurse. She kept nodding her head

and smiling all over, and she looked blurred and queer. 'Schöner Bub,' she said. 'Grosser Bub.'

"Then I got desperate and made signs that, whatever it was, it was to be brought to me right away.

"She went out and got him. But even then I didn't believe it. I thought it was somebody else's baby that they were trying to console me with. In fact, it wasn't till the whole family came in and told me we had a baby, that I was willing to believe he was really ours.

"The first day the nurse said I was to get up for a little while. Of course, I knew it was the way, here, but it scared me just to think of it. I told myself I'd try, but I knew, of course, I would just disintegrate quietly on the floor.

"But it didn't hurt me a bit. I stepped over to the couch, leaning on a nurse. Think of it. Not seventeen hours after the baby had come! To-day I've been walking all around the room, and even took some dance steps!

"I was going out motoring this afternoon," she added. "But the doctor said that the wind was blowing a good deal and I had better wait till to-morrow. But I did so want to go out the second day."

Next day Mrs. Carmody did go motoring. She called at the pension and gathered up another American Twilight Sleep mother and we went for an hour and a half's drive over the hills.

The days followed one another almost too eventfully.

"But I feel so *well*," Mrs. Carmody insisted when remonstrated with.

Little details of her personal experience of the Twilight Sleep would come out in our talk. Like other mothers, she

came out of the sleep with her sight still slightly blurred by the effect of scopolamin on the pupils, which may remain dilated for part of a day.

"One of the splendid things about the Twilight Sleep," said Mrs. Carmody, "is that you have no after-pains."

Another American mother also told us this. It seemed to her, too, that the absence of the terrible after-pains which often follow a rapid birth, was almost as great a relief as the relief of the birth-pains.

The sixth day of Mrs. Carmody's convalescence was the day of the baby's christening. Probably if anyone had told her beforehand—that is to say, at home in America—that she would drive out in a landau, on the sixth day, to her baby's christening, her faith in that person's veracity, even prophetic, would have been considerably strained. For she is one of those sadly experienced mothers who have known what it is to be a bedridden invalid for six months after a confinement.

We were interested and touched to learn that this American mother had, while awaiting the baby's arrival, and before actually having had the Twilight Sleep herself, written a long letter home to the woman's club of which she is an officer, to tell them that everything at Freiburg Frauenklinik was as represented in the June *McClure* article. She had wanted, as it were, to put herself on record as guaranteeing the facts there set down, whatever personal complications might attend her own case.

The baby's father also wrote a letter—after the event was happily over—to a Brooklyn newspaper.

"Mrs. Carmody," he writes, "entered the Frauenklinik here about 6 P. M. Monday, July 13th, 1914. She was taken in charge by Drs.

Gauss and Krönig and the head nurse. Her first injection of scopolamin was given about seven P. M. At one A. M. on the morning of the 14th, the baby was born, and for the first time she experienced a perfectly spontaneous childbirth. She slept—the Twilight Sleep—through it all, and her sleep continued until about seven A. M. on the morning of the 14th. When she awoke, she would scarcely believe that the looked-for event had actually happened. It is not the slightest exaggeration in her case to say that the confinement was absolutely painless. I saw both mother and child almost immediately after the birth. The baby was then crying lustily and Mrs. Carmody was sleeping peacefully. When she awoke in the morning, she was feeling as rested and fresh as if nothing unusual had happened during the night.

"Under the advice of Dr. Gauss she got up the same day her baby was born and walked across the room to the sofa, where she remained for an hour, and then walked back again. On the day after the birth she not only got up, but began going through a series of exercises that were prescribed for her. On the third day she went automobile driving among the mountains which surround the city and was out for an hour and a half. Yesterday, Monday, July 20th, she was out carriage driving. Every day since the birth, including that day, she has eaten three substantial meals, including meats, vegetables, soups, desserts, etc., and she feels absolutely well.

"I am not a physician. I am only a lawyer, but to my mind the secret of this activity (which is not peculiar to Mrs. Carmody's case, but is a common experience here) is to be found principally in the fact that here there are no lacerations to heal, no stitches to be removed, no contusions to nurse, and no deranged nervous system to recuperate. These things eliminated, it is not so surprising that a woman soon feels like getting up and going about. Of course there are scientific reasons given here why it is desirable to do so.

"Now, Mrs. Carmody's case is in no wise an unusual one here. Such experiences are duplicated almost daily at the Frauenklinik. There are here now a number of American women who have had scopolamin at childbirth, and their experiences, when told, sound like the report of Mrs. Carmody's case with names and dates changed. Some had some pain, depending largely, it seems, on whether or not they refused to take the drug at the outset. Some, after confinement, cannot swing themselves entirely free from the

habits contracted in former confinements of lying in bed for three weeks and do not begin their exercises as early as recommended. But making allowances for the variation of personalities, Mrs. Carmody's experience is typical. There is not an American woman here who is not an enthusiast for the Freiburg method."

APPENDIX I

PAINLESS DELIVERY IN DÄMMERSCHLAF

By Bernhard Krönig

From Deutsche Medicinische Wochenschrift

1908

Gentlemen:

You have observed the method used by us for reducing or abolishing pain in childbirth. Many of you have taken advantage of the opportunity of seeing mothers on the day after birth, out of bed. And you will have had the impression that by reducing the suffering we have not only conferred great benefit on mothers during delivery, but at the same time in consequence of the absence of suffering during delivery, the condition of the mother during convalescence is very much better than ordinarily.

Will you allow me to give you a short account of our method of procedure and of the results which we have up to this time obtained. Of late the demand made of us obstetricians to diminish or abolish suffering during delivery has become more and more emphatic. The modern woman on whose nervous system nowadays in the struggle for existence quite other demands are made than was formerly the case responds to the stimulus of severe pain more rapidly with nervous exhaustion and paralysis of

the will to carry the labour to a conclusion. The sensitiveness to pain is much greater in those who have to carry on hard mental work than in the case of less intelligent persons who earn their living by manual labour. As a consequence of this condition of nervous exhaustion, we see that precisely in the case of mothers of the better class the use of the forceps for alleviating pain where there is no structural need of the forceps has increased to an alarming extent.

When one goes into the records of the cases of women of the better classes concerning the course of their previous confinements, one is sometimes driven to the opinion that spontaneous birth is in their cases almost impossible. It is by no means unusual to hear that the forceps had to be used at every previous confinement. In sharp contrast to this, an examination shows that neither the nature of the bony nor the soft passages for delivery offers any explanation why in every case the birth should have been brought to a conclusion by operation. You learn also very soon that it is not in the least any difficulty offered by the canal or a lack of muscular power in the labour that indicated the necessity of an operation. The forceps had been used simply and solely to shorten the pains of labour.

On the occasion of the meeting of the Berlin Obstetrical Society, it came to light that obstetricians practising in the best society of Berlin were obliged to use the forceps in nearly forty per cent. of their cases. Although it may be freely admitted that in the hands of a skilful operator the forceps is not so dangerous as in those of an inexperienced one, yet to you, to whom the importance of

local susceptibility to infection has been here so often pointed out, it is hardly necessary to mention that the chances of a favourable confinement and recovery are considerably diminished by any operation. The gradual stretching of the soft parts of the mother in spontaneous birth are replaced when the forceps is used, by a more or less abrupt tearing. The fibres of the levator, which in case of spontaneous birth stretch gradually, are only too often torn during the violent extraction with the forceps. In consequence of this, as Landler, Halban, and Schatz have shown, a disposition to prolapsus of the uterus and the vagina is created. Finally, the crushed tissues, often suffused with blood, offer good harborage to any germs which may find their way in.

If you follow the lyings-in even in the best conducted hospitals, you will find the number of feverish cases—cases of temperature—is considerably higher than it is after spontaneous delivery. In the unfavourable external circumstances of ordinary practice all these injurious results increase. This fact finds its expression in the great increase of the cases of puerperal fever corresponding to the increasing frequency of operations, as shown in the statistics of the larger districts. It might have been thought that the introduction of asepsis in obstetrics and its extremely careful application outside the hospitals would have decreased the number of deaths in childbirth in comparison with former conditions. But so far from that being the case, we note unfortunately a not inconsiderable increase. Everyone agrees that the absence of a reduction in the number of cases of puerperal fever is chiefly caused by an enormous absolute increase in the

number of operations and especially a huge increase in deliveries by the use of the forceps. In theoretical medical instruction the "alleviating forceps" finds no place, but in practice the conditions are considerably different. The cases available for obstetric study in the hospitals consist for the greater part of women of no great intelligence, who earn their bread by manual labour. In private practice we have not infrequently to do with women of nervous temperaments who declare themselves incapable of enduring the pains of delivery to the end. A medical man often, in such cases, finds himself before the alternative of either ending the delivery operatively with the forceps or of retiring in favour of another doctor.

If we take the trouble to sit at the bedside of women of some sensitiveness during the whole course of labour and so observe the state of their nervous system, we are compelled to admit that in their case such nervous exhaustion does really set in, and in consequence of their sufferings all power of will to hold out till the end of birth is paralysed. I hardly believe that anyone who takes the opportunity of observing a birth in the case of one of these women from beginning to end would afterwards agree with the statement that the pain of birth is a physiological pain which is really of advantage to the mother and must not be reduced. Such a statement can only be made by those clinicians who, having to do with too large a number of cases, have not taken the trouble to follow the nervous condition from beginning to end of labour. As indeed is necessary when working on a large scale at high pressure, they content themselves at the utmost by ascertaining occasionally how the case is going on.

When Steffen, on the occasion of a discussion about the reduction of pain in childbirth, gave utterance to the statement based on the experience of a large number of cases in the Dresden Woman's Hospital that as a matter of fact he had never felt any necessity for lightening the pain felt by a woman in childbirth, this is only to be explained by the fact that he was either quite callous, or that when the screams and groans of the woman became too loud he left the room. Again, acute pain at birth can in the case of sensitive women not rightly be termed physiological, for in a considerable number of cases it occasions a condition of severe exhaustion even after the birth. Any gynæcologist who considers that he ought to be something more than merely as good an operative manipulator as possible, who thinks, that is, that he should observe the nervous system of the mother, will not infrequently note that neurasthenic symptoms appear in immediate connection with the delivery. This is by no means surprising. One would rather feel astonished that long-continued exhaustion does not occur with the birth lesions (traumata) in persons of nervous disposition more often than it actually does; when we realise what a sensitive woman has to endure during a birth, even taking only mental impressions alone.

The ground for the breakdown following birth is prepared even earlier during the period before birth by numerous bodily complaints—sickness, loss of appetite, and so forth. Hypochondriacal moods, it is well known, often preponderate in women during pregnancy. The woman has heard from her friends how difficult the birth of a child was and how great the pain; how finally the doctor used the forceps and then how long puerperal fever fol-

lowed the birth. When she herself has to give birth to a child, the first preliminary pains are probably stood well, but with their increasing frequency and violence the moral resistance breaks down. She feels her strength giving way, and does nothing but beg the doctor to use the forceps and put an end to her agony, and longs only for the moment when she will be released from pain by the chloroform or ether.

If, as often enough happens in private practice, the forceps is used without anæsthetic, because the doctor is afraid to trust the continued administration of the anæsthetic to an inexperienced helper, then, in addition to the ordinary pains of birth, the woman has the pain of the operation. The loss of blood, especially in the case of a first child, is relatively great, and bodily exhaustion is thus added to mental.

It is true that robust women can stand all this without consequent injury to their nervous system; but it is equally undeniable that, if there is the slightest inclination to a neuropathic condition, such severe bodily and psychical injury is the cause of a long period of exhaustion.

Even if it were not possible, in eighty per cent. of the cases, to abolish the apperception of pain entirely, its diminution alone would be of the greatest value.

Since the scopolamin-morphin injection put the women into a condition in which external impressions glide off them without producing any appreciable mental effect, women often describe their condition subsequently as follows: they say that the craving for sleep had been so intense that they had only the one wish—to be able to sleep in peace, and that all that was going on round them was

absolutely indifferent to them. The deep sleep into which they fall during the interval between the pains and from which they are only temporarily awakened during the pains preserves also, obviously, the bodily strength. For this reason we are very rarely compelled to interfere operatively in consequence of the insufficiency of the ejecting power of the muscles.

It must of course be required of the method that it involves no danger for mother or child. We have now at our disposal in the Freiburg clinic the records of 1,500 births, which took place during Dämmerschlaf. This number is so great that the veriest sceptic cannot refuse to recognise the strength of the proof offered by such a long list. It is obvious that it was only gradually that the treatment attained to a certain degree of perfection, and that consequently the results of our last five hundred births concerning which, as they have not yet been published, I will give some special figures, are far better than those obtained in the first period during which we were experimenting.

The history of the method follows:

Several years ago Steinbüchel had already recommended the use of scopolamin in childbirth, since it had been used in surgery. I had already begun, while working in Jena, to perfect the method by better regulation of the doses, so that the pain should not merely be diminished but completely abolished. In the Freiburg clinic these experiments were taken up on a larger scale. We have here succeeded, principally in consequence of the laborious observations and examinations of women in labour made by my assistant, Dr. Gauss, in administering scopolamin-

morphin in such doses as you will see from the statistics. On the one hand neither mother nor child suffers any injurious effects, while on the other the consciousness of the mother during childbirth is so diminished that in quite 80 per cent. of women who are treated by this method there is complete forgetfulness of the course of the birth.

The method essentially consists in reducing the mother to a condition in which she still has sense or nerve perception but not mental perception (apperception). Scopolamin brings about a disturbance of the circulation of such a kind that the pain perceived by the nerves is not felt by the woman, or in any case it disappears so soon from the memory that after birth has taken place she no longer remembers the pain. Mansfeld a short time ago brought up the question whether in this method we had a right to speak of painless delivery. He thinks that we ought not to use this expression because in distinction to complete unconsciousness women in semi-consciousness awake from the sleep for a short time during the pain, give expression to their suffering, and then, in the interval, fall asleep. He maintains that the pain is nevertheless for the moment really perceived, and consequently is not immediately comparable with the complete abolition of pain, as, for instance, in inhalation narcosis.

Practically it is at any rate comparable. Mansfeld, who occasionally took part in the observation of our cases, has also mentioned that the women, if semi-consciousness has been successfully superinduced, tell the doctor, overjoyed, when recalled to consciousness after birth, that they have felt nothing of the process. Their delivery was consequently, *de facto,* a painless one for the patient. I

think, indeed, that if one is to enter upon this discussion, which could be continued indefinitely, we are entitled to maintain that there is no difference in principle between painlessness in semi-consciousness and painlessness during inhalation narcosis. The absence of apperception of pain in inhalation narcosis can be imagined also to result from the fact that whereas the transmission of the perception of pain to the brain is hardly disturbed, nevertheless, in consequence of narcosis, the centres for the perception of pain in the brain, as is the case in semi-consciousness, are so stupefied that an apperception of pain does not take place. If, for example, in the case of inhalation narcosis, we begin the operation before complete unconsciousness is reached, we see that the women wince and even scream. If, however, we ask them about it afterwards, they state without hesitation that they felt no pain. It is consequently here also, as in the case of Dämmerschlaf, a disturbance of association which makes the apperception of pain impossible.

In our method everything turns upon the administration of the scopolamin-morphin in the right doses. Just as in the case of complete narcosis you must give neither too small nor too large a dose. If too small a dose is given, an insufficient effect is produced, and an overdose interferes with the action of the uterus in labour. As a test for the correct strength of the dose, Gauss uses an examination of the state of consciousness. It appears to have been imagined that this examination is much more complicated than it in reality is, although Gauss in his very first study clearly explained what he intended to convey by the expression. The essential part of the method is

after the administration of a certain dose of scopolamin-morphin by a subcutaneous injection to ascertain by putting suitable questions whether the consciousness of the patient is so far clouded that sense impressions received a short time before vanish almost directly. This testing of the faculty of perception is in practice much simpler than many people seem to think. It must be admitted that our method requires uninterrupted observation of the patient. We don't deny for a moment that our procedure is complicated, and we believe that hardly any medical man would be able after only a few trials to obtain the same results which we can now achieve with long experience. In such cases a little modesty is in place.

If our results are not at once obtained at the first attempt, it is better not at once to decry the method as a failure. It is decidedly preferable first to make further unprejudiced study. It must not be forgotten that it was only after a study lasting for years that we ourselves succeeded in obtaining the present results.

As our procedure has already been several times described by Gauss, I can be brief. We use two separate solutions—.03 per cent. in water of the scopolamin-hydrobromicum, placed on the market by the firm of Merck, and one per cent. morphin solution. Both solutions are kept in a clear glass protected from light and warmth. If flakes form in the scopolamin solution, it is thrown away. We generally do not begin with the first injection until the pains are distressing, of at least half a minute's duration at regular intervals of from four to five minutes. We then inject as the first dose .00045 scopolamin (1.5 c.cm. of the solution) and .01 morphin (1 c.cm.). The first

effect generally begins to be apparent in from one-half to three-quarters of an hour after this injection. The women become tired, they doze in the intervals between pains, waking up during pains to give expression to pain, but their consciousness is not yet much clouded. About an hour after the first, a second injection is made, this time of scopolamin alone, in a quantity .00015 to .00013, according to the patient's condition. The testing of the powers of perception begins half an hour after the second injection. This can be carried on in a number of ways: *i.e.*, the patient can be shown some object, and about half an hour afterwards it is shown her again and she is asked whether it has been shown her before. If she can still remember the first exhibition of the object it is a proof to us that the desired clouding of consciousness has not yet occurred, and the administration of the same dose of scopolamin as was employed at the second injection is indicated. We choose for testing the powers of observation, preferably, such objects or events as have some connection with the process of birth and are consequently sufficiently well known to the patient while not being too striking.

For instance, after the second injection the woman in labour is asked how many injections she has had. If she cannot remember that of half an hour before, it is a sign that loss of memory already exists, and that it is not necessary, for the present, to give her a new injection. Let us suppose that an internal examination is now made. This examination can be used half an hour later as a test of retention or loss of memory. It certainly requires practice and experience to decide how best to test the con-

dition of consciousness of particular patients in accordance with their intelligence. The hints already given may on this occasion suffice. No fresh injection is administered until the test of powers of perception shows recognition of an object shown half an hour before. In the case of all but the first injection only scopolamin is given usually. Morphin is only added when as happens in a few exceptional cases slight excitement is noticeable in the patient.

From what has been said, and from what you yourselves have observed in the delivery ward, you will have concluded that the proper carrying out of the method demands concentrated attention on the part of the obstetric staff. For the purpose of perfecting our method and for giving it the widest possible application to all classes of the population, we were able, thanks to the Grand Duke of Baden, to triple the obstetric staff in the delivery ward. I mention this intentionally because I am of the opinion that, especially in hospitals, with a very large number of cases, our procedure can be employed with any prospect of success only when a complete administrative reorganisation has been effected in the assignment of duty in the delivery ward. If, as is the case in large hospitals, the medical man on observation duty is relieved every twelve hours, the colleague who comes on duty will not be sufficiently well informed as to the condition of the various patients in labour. In such a case, failure is certain beforehand. I consequently do not consider it the result of chance that it is precisely in hospitals with a smaller number of cases that our method has been adopted. In large hospitals with many thousands of births a year, as in the

cases of the large hospitals of Berlin and Dresden, our procedure has proved a total failure.

This is easier to understand when we remember that the surroundings of the patient have an importance which should not be underestimated for the success of the method. Sense impressions, loud noises, bright light, etc., considerably disturb the half-consciousness. When six or seven parturient patients lie side by side in one ward, it is obviously impossible to obtain an even fairly effective semi-consciousness. This makes itself felt even with the small number of patients that we have. The number of cases in which we obtain loss of memory (amnesia) is in Freiburg far smaller in those deliveries which occur in the general ward than in the case of patients treated in the private wards where they lie in a separate room protected as far as possible from all impressions of sight and hearing.

How is it with the disadvantages for mother and child of this method? Gauss has already in an earlier paper published results of our first 1,000 deliveries. In it he shows in detail by figures what importance the method has for the course of the pains. He shows also, for the period after birth, its importance on the general condition of mother and child. The results of the observations of deliveries which have now increased to 1,500, have in general only confirmed what was then maintained on the basis of the statistics then available. If the drug is administered in the proper doses no unfavourable influence upon the course of the birth can be proved.

If the writers of other papers have experienced a somewhat large number of cases of subsequent atonic hæmor-

rhage after injection of scopolamin-morphin that is the result of their not having administered the drug in the right doses. We regularly measure the quantity of blood lost in the period after birth and the result mentioned by Gauss has always been obtained: namely, loss of blood after birth does not exceed the physiological quantity. As far as regards the mother our results can be regarded as thoroughly favourable. From the 1,500 patients who have been delivered in Dämmerschlaf, only one woman died during childbirth. This cannot possibly be attributed to scopolamin-morphin, as it was a woman with a narrow, funnel-shaped pelvis, whose husband refused to consent to cæsarean section although it was absolutely imperative. During the discussion with him the woman's uterus ruptured. As the husband even then refused consent to the operation, the woman bled to death. The postmortem showed kolporrhexis.

Scopolamin is, it may be admitted, a drug which must not be used without the strictest attention to the dosing. All deaths which formerly took place during surgical operations after its injection are without exception to be attributed to the administration of too large a dose. There are, I imagine, nowadays, very few surgeons who do not successfully use this splendid narcotic. We have already for several years been using it as a preliminary to every chloroform-ether narcosis and to every anæsthesia of the spinal cord. The number of operations, which amounts to many thousands, has shown us, as it has shown other operators, that in scopolamin we possess one of the most humane and valuable narcotics known.

The duration of birth is either not increased at all, or is

increased to a quite negligible extent in comparison with the natural duration, by the use of scopolamin-morphin. But even if the observation of very large numbers of cases should ultimately show that the duration of birth when this method is employed is really increased by perhaps half an hour, I believe that this consideration cannot possibly be seriously allowed to outweigh the great blessing which we confer upon the mother by reducing the pain she endures.

To form an idea of the beneficial effect of scopolamin-morphin injections in midwifery cases it is only necessary in the case of a woman who has had several children and who formerly was delivered without and now with anæsthesia, to inquire in the early stages of recovery how she feels. Such women state unanimously how much better they feel after the birth now that methods for reducing pain are used. In the whole course of my career as a surgeon I have never harvested such a crop of gratitude as I have for the use of the Dämmerschlaf in deliveries.

Fifteen hundred cases is, I think, a sufficiently large number to prove the safety of this method for the mother, provided that it is properly carried out by a trained staff.

The opponents of the method consequently now take refuge in the objection that even if the procedure involves no danger for the mother, it is yet dangerous for the child. First, they maintain that the number of children who die during birth is greater; and, second, that it may occasion injury to the bodily and mental development of the children later on in extra-uterine life.

Like every other anæsthetic—morphia, chloroform, or ether—scopolamin also passes during the birth in minute

quantities from the mother to the child. We are able by a physiological action on the eye of the frog to prove the presence of incredibly small quantities of scopolamin. By means of this reaction, Holzbach was able to show in the case of children born in our wards that the fresh urine after birth does contain scopolamin in very minute quantities. He was able, however, at the same time to prove that within only a few hours scopolamin was eliminated from the organism. The quantity of scopolamin which passes from mother to child during birth is generally so small that it exerts no ascertainable effect on the organism of the infant. It is only in rare cases—ten per cent. of births—that the children are oligopnœic, but nothing beyond simple mechanical stimulus, such as massage, is ever required to rapidly produce regular breathing, even if one does not prefer simply to wait quietly for the child to breathe naturally of its own accord. It was prophesied that in consequence of this the mortality of children during birth would be considerably increased, by the oligopnœa leading to fatal asphyxia. Here also we are able from the results of a large number of cases to prove the contrary. First, the number of cases of oligopnœa in our practice have very considerably decreased with the improvement of the method; at first it was 20 per cent., now about 10 per cent. Second, what is most important, on setting out statistics of the number of children who died during birth before and after the introduction of the scopolamin method it turned out—a fact which at first astonished even ourselves—that in comparison with former conditions the mortality of children during birth had considerably diminished. We have had, for example, in the

last 500 deliveries under scopolamin only one child to mourn which died during birth; three other children died within the first three days after birth. From these figures we exclude premature births in which the child weighed less than 2,500 grammes. For this strikingly low mortality of the children during and after birth Aschoff has offered perhaps the right explanation: namely, that slight narcotisation of the respiratory organs during birth by extremely minute quantities of scopolamin is advantageous to the child. If we in fact conduct an autopsy of children who have died during or shortly after birth, we can frequently trace inhaled amniotic fluid, with vaginal epithelium and vaginal bacteria in the smallest bronchial tubes. Interruptions in the placental supply of oxygen to the child easily occur during the period of injection, especially if the head lies low. If the child itself immediately responds to a moderate lack of oxygen by premature respiratory movements, permanent obstruction of the air passages by inhalation of the amniotic fluid takes place. If, on the other hand, the child is slightly narcotised by scopolamin, it does not immediately respond to a small accumulation of carbonic acid in the blood by premature respiratory movements. The passages remain free, and if slight asphyxia occurs after birth a more rapid resuscitation of the newborn infant is possible. These theoretical considerations are no doubt open to dispute; the fact, however, remains that in a number of cases large enough to found some conclusions on, the mortality of children during and soon after birth has very considerably decreased with Dämmerschlaf.

The last objection, which is still brought forward by

opponents: namely, that the child will later on be injured by the small quantities of scopolamin passed on to it, can of course only with difficulty be refuted by statistics. On the basis of the births in the private wards, totalling 305, where we have traced the greater number of the children, we are already in a position absolutely to refute the expectation expressed in some quarters that the children would display a higher death-rate in the first year of life. We can also definitely prove that both the physical and mental development in these children is absolutely normal. I must, however, admit that members of the present generation will hardly be able to reply to an objection which has recently been made by opponents who found themselves driven into a corner. This objection is that the injurious effects would show themselves in the mental development only at the age of between twenty and thirty. On this point we must allow so eminent an alienist as Hoche to speak. For this objection he has only the answer that such an assertion is simply nonsense and can hardly be seriously discussed. We, for our part, as gynæcologists, cannot suppress the remark that this objection shows what unfair standards are applied when it is a question of opposing a new method. This is the more noticeable when we remember that obstetricians practising among the better classes use the forceps in almost every other case, and consequently in these cases employ anæsthetics, chloroform and ether, the transmission of which from mother to child has been proved, and when we in addition take into account the not inconsiderable injuries often inflicted on the brain of the child by the forceps. In no small number of cases the forceps cause subdural hæm-

atoma and a pressing inward of the skull, as has been shown by experience in hundreds of cases. When we consider all this we are compelled to ask ourselves in amazement why it occurs to nobody to draw attention to the fact that the brain action of the child is injured by these innumerable forceps operations, while it is maintained that extremely minute quantities of scopolamin, which, as Holzbach has shown, disappear within only a few hours after birth, influence the brain action of the child up to quite an advanced age.

It is not necessary, perhaps, to say that even in the private wards we have not used the forceps to relieve pain on a single occasion since the introduction of the method. If we may consider this last objection of our opponents, contrary to all experience as it is, as having been refuted, we may claim to have shown by our large number of cases that in our method we possess a procedure which, while in no way endangering either mother or child, has attained the end in view: namely, either the complete abolition of the apperception of pain in childbirth, or, at all events, its reduction to a minimum.

APPENDIX II

BIRTHS IN ARTIFICIAL DÄMMERSCHLAF

By Dr. Carl J. Gauss

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Von Steinbüchel's introduction of scopolamin-morphin into obstetric practice, which was at that time a virgin field, was a scientific event of the most far-reaching importance.

Scopolamin-morphin narcosis has made its way in consequence of the priceless work of Schneiderlin and Kroff beginning in Freiburg, into general medical practice, and hitherto has found its principal applications in surgery and in the treatment of the insane.

It is not necessary to follow in detail the gradual development of the method. I will confine myself to giving a sketch of the present state of the discussion as to its application to obstetrics and, in especial, of the experiences made with it in the Freiburg University Gynæcological clinic.

Up to now, only four other obstetric institutions have followed the example of Von Steinbüchel's clinic at Graz in adopting scopolamin-morphin seminarcosis, as this method of employing the drug has been termed.

Jena, Giessen, Budapest, and Klagenfurt have taken up the method as a means of alleviating suffering in birth, and up to the present 225 cases in all of the use of scopolamin-morphin seminarcosis in confinements have been published.

To these 225 cases I can add another 500 observed by myself in the Freiburg confinement wards.

The object of this paper is to communicate the results of these experiments of my own which, as will be seen, differ in principle from all others hitherto published, and the experience I have gained from them.

Before beginning my investigations, I endeavoured to gain clear ideas upon some theoretical questions connected with the use of scopolamin-morphin in obstetrics.

The question is again and again asked: "Are we justified in diminishing the sufferings of a woman in a completely normal confinement by means of anæsthetics?"

I hear the answer that the suffering in confinement is physiological, and that it is not right to interfere unnecessarily with the course of natural processes.

But what is physiological? And what is normal?

It may be admitted that a mentally and physically completely healthy woman of child-bearing age can stand the physiological sufferings of a normal confinement, certainly only by calling upon all her mental and physical strength, but yet without permanent injury to body or mind. But what about a woman having a first child at a more advanced age, whose soft parts often offer a much stronger resistance to extension? What about a patient with rickets, whose pelvis requires an especial process of birth and abnormal violence of the birth-pains to make spontaneous

birth possible? What about a patient with generally narrow pelvis, in whose case in addition to the pathologically protracted course of the birth an increase in the physiological pressure and crushing pains, which in normal cases are bad enough, also occurs? . . . Does the maxim as to the physiological pain of a natural process apply also to them?

Is an anæmic or a neurasthenic mother of many who presents the country with a new citizen every year and nevertheless has to conduct her household with prudence and energy, year in, year out . . . is she, I say, as well able to stand the physiological sufferings of an extreme exertion of bodily and mental powers as well as a young and vigorous woman?

If the medical man is allowed in these cases to reduce the pain, it must of course be assumed as obvious that the means of alleviation used are non-injurious.

But if this demand is fulfilled, what objection can there be to allowing every confinement patient to participate in the advantages of a reduction of pain?

It is one of the most depressing moments which fall to the obstetrician's lot when he must turn away from a patient beseeching his help without being able to afford her the slightest reduction of her sufferings. It is not much consolation for her to hear that everything is going on beautifully, and not a very inviting prospect to have as only comfort to the end of the ever-increasing tortures the cold maxim, "The more violent the pains, the more rapid the birth."

In short, I come to the—of course entirely subjective—conclusion that there are no ethical objections against the

use of scopolamin-morphin seminarcosis for normal more than for abnormal births; that it is, on the contrary, a genuinely humane exercise of the art and science of medicine to afford the mother in every case the blessings of a reduction of suffering, provided of course that the scopolamin-morphin seminarcosis used for the purpose can satisfy the conditions required of it.

What qualities should be required from a narcotic which is to be used for spontaneous uncomplicated births?

First as regards the mother:

There must be a really considerable reduction of pain, clearly perceptible both by the patient herself and by the attending physician.

Unpleasant accessory effects must either not occur at all or can be tolerated only if—being inseparable from the attaining of a sufficient degree of narcotic action:

(a) They are not injurious to the patient, and

(b) They are, in their intensity, not obviously disproportionate to the degree of alleviation obtained.

In especial:

Neither nausea nor any other appreciable feelings of discomfort must occur either during the course of the seminarcosis or as sequels to it.

The normal progress of the birth must not be endangered by unfavourable action on

(a) the birth-pains

(b) the muscular contractions

(c) the pains of the afterbirth, and

(d) the action of the organs involved in the stoppage of blood loss and puerperal involution.

As regards the child, it must not be injuriously affected

(1) during intra-uterine life, and
(2) in extra-uterine life—that is,
    (a) in the initial action of the bodily functions
    (b) in the course of the next few weeks, and
    (c) in the child's later development.

It was upon these certainly stringent conditions that I based the investigations undertaken by me at the suggestion of my chief, Professor Krönig, in the obstetric section of the Gynæcological wards of the Freiburg University.

As the recorded experience of the use of scopolamin-morphin seminarcosis in obstetrics was very limited, I considered that I should set to work with the greatest caution.

I therefore did not begin the injections until it was certain from the stage which the birth had reached that if any unforeseen injury should be caused to the organism of either mother or child by the narcosis, the birth could at any time be brought about operatively without danger. At the same time, I at first excluded from treatment with seminarcosis all cases in which there were any complications unfavourable either for mother or child: *e.g.*, mothers with primary weak birth-pains, with narrow pelvis, *placenta prævia*, and habitual irregularity of the placental period.

Later on, in reliance on my own favourable experiences of the method, I saw even in these complications no contrary indication, but gave injections to practically all mothers who gave their consent.

The few remaining factors that I still regard as contrary indications will be mentioned later.

Scopolamin-morphin injections have been up to the

present in the Freiburg Frauenklinik employed in nearly 600 births. I have based my paper on the first 500 births.

As, during the period in question, a total of 731 women were delivered, we see that scopolamin-morphin was administered in 68.3 per cent. of the cases.

Of the 500 women, 233 (46.6 per cent.) were having their first child, and 267 (53.4 per cent.) had already had one or more children.

The patients giving birth to the first child ranged in age from nineteen to thirty-five, the average age being twenty-four. The others ranged from nineteen to forty-five, with an average of thirty.

Of the 500 births, 483 were head presentations, 6 face presentations, 4 breech presentations, and 7 cross-presentations.

Amongst these cases, the following complications presented themselves:

Narrow pelvis	40
Hydramnios	5
Prolapsed cord	4
Nephritis	2
Eclampsia	3
Partial premature detachment of placenta	2
Placenta prævia	3
Habitual hæmorrhage after birth	1
Habitual adherence of placenta	1
Rupture of the cervix	2
Uterus myomatosis	2
Vitium cordis	1
Fever during birth	15
Pneumonia	1
Peritonitis	1

As to the frequency of operation, the following may be stated:

Of the 483 head presentations there were 434 spontaneous births. In 49 cases the forceps was used—in 14 because absolutely necessary for the mother, in 22 because necessary for the child, and in 14 in consequence of a relative indication (retarded rotation or ejective action). Subcutaneous hebotomy was performed 4 times, the classical cæsarean section 1, and vaginal cæsarean section 1; foot rotation in a case of head presentation was carried out 4 times—once on account of placenta prævia, once on account of prolapsed cord, and twice (twins) on account of high fever in the mother.

Rotation was carried out in 8 cases of cross-presentation—3 times to head on account of the cross-position, twice to a foot presentation after failure to produce head presentation, 3 times on account of prolapsed cord.*

In addition to the individual sensitiveness of the patient, the time that has elapsed since the injection, and the dose employed, have of course a great effect on the nature of the action of scopolamin-morphin.

The first sign of the action of the drug is pronounced weariness, which very soon passes into a peaceful sleep occupying the whole of the pauses between the pains, but out of which the patients are startled by every pain.

The suffering during the pains is indeed at this stage

* 42 minor operations were performed, including 30 stitchings of lacerations; also 7 operations in placental period.

Description of preparation of the drug is omitted since preparation makes it unnecessary.

clearly perceived as such, but is considerably reduced: in fact, and—at least in the case of critical and intelligent people—also subjectively. At this stage I have often heard such spontaneous remarks as, "How nice (sic) it is to be conscious of the pains but to feel no suffering!"

Gradually further signs of the commencing action of the drug occur: thirst, with a dry feeling in the mouth and throat, flushing of the face, occasionally slight twitching in the flexor muscles of the fingers, and sometimes a certain degree of motor restlessness. After longer action and sufficient dose, the sleep becomes deeper, so that even during the pains the patients do not become fully awake, and the only signs of the pains are painful contortion of the expression muscles of the face, slight groaning.

But consciousness is at this stage fully retained. The patient can remember exactly anything done to her. It is this stage that those who have hitherto championed the scopolamin-morphin seminarcosis regard as the goal to be aimed at.

But in consequence of the results of my cautiously made investigations I have gone further.

Only a slight deepening of the seminarcosis is sufficient so to cloud the consciousness without entirely abolishing it that the final result of a skilfully graduated dose is a kind of artificial fuddled condition the principal characteristic of which is a complete amnesia extending over the whole process of birth.

I said to myself it is undoubtedly a great advance to be able to diminish the suffering of the mother. But in spite of this every patient would have the impression in consequence of the continuous increase in the intensity

of the pains up to the end of the birth that her sufferings, in spite of the injection, also increased. The injection would be a great advantage to the patient, but one the value and importance of which for the reasons mentioned above would often be greatly underestimated by her, especially in the case of inexperienced mothers at the birth of the first child.

As, however, a slight increase in the dose injected is sufficient to produce total loss of memory of the sufferings during birth, and of all occurrences taking place while the dose remains effective, there seemed to me to be no doubt that the object of the seminarcosis must be to put the patient into that kind of Dämmerzustand which she afterwards is unable to remember.

It is this point which distinguishes my investigations and results in principle from those of other obstetricians who were all satisfied with having reached only painlessness, or, to speak more accurately, a sort of subpainlessness.

After the first groping attempts which as they only aimed at a hypalgesia confined themselves to the limits of the investigations carried out in other clinics, I injected such doses that the object aimed at—complete loss of memory of the birth—was as far as possible reached.

This object could of course not be obtained in all cases. In the first place a number of patients arrived so late for treatment that the injection could not take effect until the birth was practically over; of such cases there were 28—that is, 5.6 per cent. amongst the 500 recorded births. The only effect of the injection was a sound, peaceful sleep

following the birth and often also a clouding of the consciousness, which only set in after birth.

A second group of patients showed indeed a clear and objectively observed diminution of pain. But the women themselves spoke in the most contradictory manner, corresponding to their various degrees of judgment and intelligence as to the extent of the effect of injection.

This group included 91 of my 500 cases (18.2 per cent.). In their case the dose given was not sufficient to produce a profound effect in the time at our disposal, because either this time itself was very short, or because the patients turned out to be somewhat refractory to a dose that on the average had proved sufficient.

The third group—381 in number (76.2 per cent.)—of my cases consists of those patients in whose case the desired effect was, at all events for a part of the time, fully attained.

In their case, as in that of the others, a clear reduction of suffering and sleepiness first appeared; but on administering a sufficient quantity of the drug in making the injections, concerning which I shall go later into more detail, the patients fell into a kind of Dämmerzustand in which sensory impressions were no longer permanently recorded, and as to which, consequently, according to its depth and effectiveness more or less compete amnesia exists.

The patients react in a very varying manner whilst in this condition.

The majority of the patients impress one as being indeed sleepy, but otherwise quite normal. Every pain is accompanied by clearly perceptible if often only slight

expressions of suffering. The pains and the accompanying sufferings are referred to and felt clearly as such. Every question is perhaps sleepily but nevertheless clearly answered.

In this stage nothing beyond the very pronounced weariness of the patient strikes the unprejudiced layman or even a medical man who was unaware that an injection had been given. So much the more astonishing is it subsequently to learn that the patient whom one believed to be completely conscious has, after the birth, not the slightest idea of what she has just gone through, or of the conversation held with her.

The term seminarcosis does not do justice to the peculiarity of this most curious condition of consciousness, which has much more resemblance to the waking condition than to narcotic trance. The patient is in a stage of artificial sleep from which she may wake or be awakened at any moment for a short time; at the same time, however, during the whole period of the action of the injections she displays the amnesia characteristic of this clouded mental condition.

Taking into consideration these two principal symptoms of this intentionally produced and peculiar condition, and also the difference in principle between it and the conditions of seminarcosis hitherto reported on, I consider myself entitled to speak of my method as an artificial Dämmerschlaf.

If it is perhaps intelligible that the patient should no longer quite clearly remember events further in the past, it is yet sometimes in the highest degree striking how little remains in the memory during the reign of this arti-

ficial state of clouded intelligence of the most important occurrences in the immediate past; for example, the birth which has just taken place. It may perhaps be of interest if I here give a few examples of daily experiences in our delivery ward.

I have often seen the patient, after the last and successful ejection pain, sink back on the pillows with the sigh of relief, "Thank God, that's all over!" She had consequently, at the moment, a clear perception of the birth that had taken place, and took also the greatest interest in the child, its sex, state of health, and crying. If, however, she were asked about ten or twenty minutes later some such question as when her child was coming, she would reply that she didn't know; that it wouldn't be much longer, or would give some similar answer which clearly showed that the fact of the birth having taken place, although it had been certainly perceived, had yet not been included in the storehouse of memory. In other words, that—as the alienists say—it had been perceived but not apperceived.

At this stage it is my custom to show the mother her child. At this dramatically effective moment the mothers divide themselves into two groups.

Those of the one group, obviously those sceptically inclined, will not hear of the suggestion that they have borne a child without pain, and are either offended or amused. Some of them declare the child to be ugly, and therefore probably the property of the occupant of the next bed.

The others, in consequence of our having previously discussed painless birth with them, are more predisposed to belief although with the utmost astonishment they re-

joice that they have already got through the birth. It is, however, quite easy subsequently to suggest to them that a joke has been played on them, if indeed they have not already after a quarter of an hour entirely forgotten that the child had been showed to them.

A patient of this type presented her own child to her indignant and horrified husband as being that of her neighbour, at the same time expressing the greatest longing that the child she was expecting should also be a boy.

I felt able in this case to promise the woman a boy with the greatest confidence.

Another patient, when asked whether her child had already arrived, replied with a superior smile that she could feel that it was still within, and, in addition, perceived clearly the movements of the child. Not until a heavy bag of sand had been removed from her body did she finally allow herself to be convinced that the delivery had already taken place.

A whole series of patients were removed from the delivery ward in the conviction that they were being taken back because the birth pains were too feeble.

The patient who had just been delivered and who once before, four weeks before her baby was due, had had birth pains and been taken to the delivery ward but after that had been again up and about for a month, absolutely refused, from fear of the ridicule of the other women in her ward, to allow herself to be once more carried out of the delivery room without having attained her end. Others again considered the fact that they were carried back the best guarantee that the birth must have taken place; and as to the identity of the children that were given to them

relied entirely upon the honesty and uprightness of the attendants. Under such circumstances the well-known Kwilecki case would have been unnecessary.

A section, but only a small section, of patients treated with scopolamin-morphin display a quite different picture. They impress the spectator most clearly as having a very clouded or entirely inhibited consciousness, and this in one of two possible ways.

Either they sink into a deep sleep in which they, when addressed, either do not respond at all or do so only sleepily and imperfectly.

Or, the effect of the drug displays itself in an exactly contrary manner by a more or less intense condition of excitement, so that it is precisely the watching of these patients that gives the medical man and the assistants the greatest trouble. Such women in some cases only exhibited an increased motor restlessness which found expression in motiveless grasping movements, or in—sometimes violently—insisting on getting out of bed. In most cases the necessity of going to the W. C. was given as the reason. In some of these cases continual holding or binding the hands was absolutely indispensable. In all, I have observed such conditions about seven times.

In a few cases clear symptoms of delusions of guilt were observed in the course of the birth. Three of the women declared their agony of suffering to be the natural consequences of a more or less sensational slip from virtue of which they imagined themselves to be accused.

Not one of them remembered these events after the birth.

I have hitherto found no clear explanation for this

effect of scopolamin-morphin, which has also been occasionally observed by alienists, the number of observed cases being too small. Perhaps the most probable solution is that this undesired effect of the injection is simply the result of a large overdose in the case of a specially susceptible patient for whom a smaller quantity would have sufficed. Corresponding to the special effects of morphin and of scopolamin alone to be mentioned in the section on dosage, one would have to attribute the comatose type of overdosing effect to an excess of morphin, and the excitement to an excess of scopolamin. This view is supported by the fact that I observed the first form principally during the period in which large doses of morphin were used, and the latter form only since the morphin dose has been reduced.

I will conclude my observations of the narcotic action of the scopolamin-morphin injections with the following résumé:

The pain-reducing and soporific effect when the drug has acted for only a short time is extremely pleasant to the patients, so that they often describe the condition produced, in so many words, as "comfortable and pleasant," and generally ask for a new injection, of their own accord, when the effect wears off.

The Dämmerschlaf of the patient which begins when the action of the drug is more intense and in which she experiences a clouding of the consciousness but no deprivation of consciousness is, however, absolutely ideal. One special peculiarity of the Dämmerschlaf—the amnesia, which is generally complete—is especially pleasant and desirable, and that on various grounds.

The fact that there is absolutely no memory of the exertions which towards the end of the birth become more and more frequent and intense does away with that condition of mental exhaustion that we so frequently observe in protracted births. By this I mean a condition in which birth-pains occur, but the patient in consequence of her mental and physical exhaustion is not in a condition to take effective advantage of them by active co-operation.

It is obvious that sensitive and nervous individuals are most liable to this undesirable interference with the progress of birth which is so often observed and is known as secondary insufficiency of birth-pains.

It is precisely in the case of patients who are already in a highly excited condition when they come to be treated, and especially in the case of those who have previously had to endure fruitless attempts to deliver them, that the effect of the injections is so beneficial that under such circumstances I should be sorry to have to do without them.

In conclusion I believe I am entitled to ascribe yet another quite special advantage to the amnesia obtained by means of scopolamin-morphin Dämmerschlaf. It is well known how seriously the nervous system of a woman is or may be affected by a difficult birth which demands the exertion of the last remnant of her mental and bodily strength, and that such a birth, if a corresponding tendency already exists, might possibly give rise to more or less severe nervous exhaustion in which the memory of the terrors of child-bearing, and the fear of a repetition of them may reduce the woman's capacity for work and embitter her whole life. The army of suffering women

who, although they exhibit no signs of definite disease of the organs of generation, yet consult the gynæcologist because they attribute the general nervous complaints caused by the memories of child-bearing to this region, shows emphatically how extremely injurious to the nervous system a birth may be in an organism disposed to nervous weakness.

Now there can be no possible doubt that birth loses the character of an injurious trauma to the same extent as the physical suffering and the mentally injurious impressions are reduced or even completely abolished.

It is therefore not only easily conceivable but even very likely that a woman with a predisposition to nervous troubles—nervous attacks caused by overexertion, neurasthenia, hysteria, etc.—might be spared the undesirable sequelæ of childbirth to which she might otherwise easily have fallen a victim, merely by blotting out her recollection of it.

Although considerations of this kind are of the nature of theories, which it is difficult to rigidly prove, yet one is certainly to some extent justified in drawing conclusions from the degree of exhaustion exhibited by the patient on leaving the delivery room as to how far she has been tried by the birth. How many women feel the effects for days, and cannot get rid of the exhaustion and lassitude which remain! It is perhaps due to the avoidance of this state of exhaustion that the women delivered under the influence of scopolamin-morphin almost always pass the very first night after the birth in a deep and refreshing sleep which many a woman, delivered in the ordinary manner, cannot obtain although greatly in need of it.

The statement so often made to me that a patient had never been so comfortable after a birth, the repeatedly made observation that the women in consequence of their loss of memory believed that they had been in labour for only about a third of the real time—these two facts can only confirm me in the belief that in the scopolamin-morphin Dämmerschlaf we have an efficacious means of doing away with the nervous sequelæ of childbirth.

The question whether the scopolamin-morphin Dämmerschlaf suffices for the carrying out of obstetric operations is of practical importance. That the answer to this question is in the negative will, considering the description already given of the action of the injections, excite no great surprise. For obstetric operations a complete relaxation of the walls of the abdomen and immobility of the patient are in most cases necessary, and these can only be obtained to an approximately sufficient degree if the depth of the Dämmerschlaf has far overstepped the boundary separating it from more or less deep genuine narcosis. In a few isolated cases I have been able under such circumstances to use the forceps and to make a perineal suture or a hebotomy without needing the use of another anæsthetic. As, however, for the sake of both mother and child, a scopolamin-morphin narcosis should be avoided, it is obviously necessary to have recourse to another narcotic if an operation has to be made.

For this purpose, we use the most various methods of obtaining narcosis in the particular cases for which they appear most suitable.

We have frequently used ether-chloroform-oxygen, ether-chloroform, laughing gas, and ethel-chloride in con-

junction with scopolamin-morphin to our complete satisfaction and without injurious results to either mother or child. A special advantage of the Dämmerschlaf for the use of the anæsthetic mentioned is that neither the struggling on the part of the patient due to sensations of suffocation nor the stage of excitement occur at all in the majority of cases.

We have recently experimented extensively with Bier's lumbal anæsthesia produced by means of stovain alypin and novocain suprarenin in connection with the Dämmerschlaf, and have not observed any unfavourable results arising from the combined use of both narcotics. In this case also the scopolamin-morphin Dämmerschlaf proved its usefulness as a method which very considerably reduces the sensitiveness to stimulation and which consequently has enabled the medulla narcosis to be employed to a much greater extent.

In what quantity and how must scopolamin-morphin be, then, introduced into the body to produce Dämmerschlaf?

The dosage is naturally entirely different from that employed in surgery. In the first place, a woman in childbirth is in any case much more susceptible than usual to all narcotics, so that much smaller doses would suffice to produce the effect desired by the surgeon: viz., complete narcosis.

In the second place, it is far from being our intention to attain a deep narcosis. We must even, on the contrary, avoid this, as we insist on the condition that the groups of muscles which play the most important part in the work of birth, those which together produce the straining action,

should retain their effective action, and that not only as regards their voluntary but also their involuntary action.

The object to be attained by the use of the scopolamin-morphin Dämmerschlaf in obstetrics is, in fact, nothing beyond a reduction of suffering, and that slight degree of clouding of the consciousness in which impressions are perceived indeed by the patient, but not apperceived. It is obvious that the dosage employed by me for the injections during the period embraced by the 500 births has not remained the same as that at first employed. As I of course in the first attempts went to work very cautiously, I had frequent failures with the small doses initially employed. Encouraged by the first successes, but not yet satisfied with the results, I then tried larger doses, and found that in most cases the stage of Dämmerschlaf could be reached and that in almost as short a time as one liked. But that as the price of a too large dose in proportion to the time unpleasant accessory symptoms have to be put up with which as a matter of fact should be avoided. Further experiments served to ascertain whether simply the quantity of scopolamin-morphin solution used in a given time, or whether an excess of one or other of the components of the mixture, was responsible for these undesirable accompaniments. By systematically carried out series of dosings I came to the conclusion that in most cases the undesirable concomitants were due to a too large dose of morphin. When the quantity of morphin was reduced, they disappeared, whilst the narcotic action of the injection was in no way reduced.

The conclusive test was a series with an increased quantity of morphin and a series with scopolamin alone; whilst

in the first cases the concomitants were still more pronounced than before, they were only observed in the second series when the dose necessary for prolonged sleep was considerably exceeded.

In spite of this, the use of scopolamin alone did not appear advisable, since as had been already observed by alienists and pharmacologists it occasioned in many persons a condition of excitement. It seemed best, therefore, to use in addition to the scopolamin a sufficient but not too large quantity of morphin, so that the unpleasant attendant effects, whether of morphin or of scopolamin, can be avoided without any diminution of the narcotic action.

It is not possible to discuss here in detail the various series of experiments on dosage upon which I have based my conclusions. Anyone who wishes to check my results I will gladly allow to see the innumerable series of lists and tables drawn up from various points of view.

For the above reasons I thought it advisable to use two separate solutions prepared by a pharmaceutical chemist: a .03 per cent. solution in sterile distilled water of the crystalline scopolaminum hydrobromicum sold by Merck, and a 1 per cent. morphin solution. I continue to use both until cloudiness and the formation of flakes show that they are going bad. I have ascertained by experiment that the solutions have remained effective for over a year; an addition of carbolic acid did not prevent the solution from deteriorating.

The opinion that the very varying action of the drug is due to instability in its chemical constitution caused by some unknown factor must be regarded as erroneous. I was able to prove that one and the same solutions produced

effects differing greatly in degree in the case of different persons on the same occasion and also in the same person on different occasions.

We are therefore compelled to assume a variation in the susceptibility of various constitutions for the action of scopolamin-morphin and also the variation in the susceptibility of the same person at different times—a conception which in itself is in no way improbable.

I have been able to ascertain only partially on what factors this varying susceptibility depends.

To a small degree the weight of the person, if constant for considerable time, has an influence: tall, massively built persons usually require a larger dose than short and slender ones.

Conversely, all organisms which have been pulled down by illness, exhaustion, or anæmia, react to scopolamin-morphin to a greater extent. In the case of such patients, therefore, one must begin with smaller doses. The use of alcohol appears to be without any considerable influence on the success of the injection. At all events, natives of Baden who are accustomed to indulge in alcohol in very considerable quantities display no striking resistance to the action of the drug.

This varying degree of reaction in different individuals which it is hardly possible to ascertain with certainty beforehand leads to the conclusion that the precaution should be taken of making the first injection rather a little too scanty than too generous.

I generally begin with a dose of .00045 to .0006 scopol. hydrobromic. and .01 morph. mur., which in the case of persons of average constitution and susceptibility gener-

ally develops its full effect in from forty-five minutes to three hours. If the desired effect is not obtained, a second injection of .0015 to .0003 scopol. hydrobromic. without morphin is then given, which almost always takes effect in about a quarter to half an hour. When signs appear that the action is passing off—that is, in general after from two to four hours—another injection suited to the special circumstances of the patient is necessary. A repetition of the second dose in general suffices, which is only strengthened by the addition of .005 morph. mur. if the patient, whether unintentionally or at the will of the medical man, has been again completely conscious for a considerable time.

It is my experience that a Dämmerschlaf induced in the manner described above can be maintained for several days without injurious consequences, especially as with reasonable practice and care the danger of overdoses is easily avoidable.

The period of time elapsing between the first injection and the birth of the child in Dämmerschlaf was:

Not over	half	an	hour	.....	31 cases
"	"	1	"	.....	38 "
"	"	2	hours	.....	64 "
"	"	3	"	.....	86 "
"	"	5	"	.....	78 "
"	"	7	"	.....	64 "
"	"	10	"	.....	66 "
"	"	15	"	.....	42 "
"	"	20	"	.....	23 "
"	"	25	"	.....	8 "
"	"	30	"	.....	3 "
"	"	35	"	.....	3 "

Not over	40	hours	3	cases
" "	50	"	1	case
" "	57	"	1	"

In 13 cases the injections were for various reasons interrupted. These were mostly births during the first period of the investigation, when in consequence of insufficient certainty in judging of the eventualities occasioned by the action of the scopolamin-morphin one abstained from further injections if any complications appeared. More recently the only grounds on which the injections were interrupted were the contrary indications to be considered more in detail below.

The largest total doses administered to an individual patient amounted to .0031 scopol. plus .0475 morph. over a period of 48 hrs. in one case; of .00315 scopol. plus .025 morph. in 47 hrs. in a second case; and of .0036 scopol. alone in 36 hours in a third case.

The longest time in which a patient was under the action of the drug was 48 hours, in the case of a patient for whom .0031 scopol. plus .0475 morph. were necessary to maintain the Dämmerschlaf.*

When we remember that many surgeons often administer such quantities of scopolamin-morphin in three doses within four hours to obtain general narcosis, we certainly can't raise much objection to the very modest claims of

* Since writing this paper I have even kept a patient under Dämmerschlaf for more than 57 hrs. for which a total of .00375 scopol. + .03 morph. was necessary. She was 36 years old and having a first child. The soft parts were rigid, there was premature bursting of the membrane, and it was a very large child. Mother and child are doing well. The former had no idea how the birth had taken place, the child was born active and lusty. (C. G.)

the obstetrician. At all events, it is not justifiable to bring those serious accusations against the obstetric doses which recently, especially by French writers, have been brought against the large surgical doses. And precisely on account of the absolutely different system of dosing, any parallel between the means of application of the two methods must be energetically repudiated.

The problem of maintaining the uninterrupted action of scopolamin-morphin is more difficult than that of inducing it. The most obvious idea would be to deduce the narcotic action from the signs of pain shown by the patient. But these exhibitions of pain only cease entirely in a small proportion of the cases. And besides this they also increase physiologically even in artificial Dämmerschlaf towards the end of the birth, so that for these reasons they afford no reliable clue to the extent to which the consciousness is clouded.

In the search for better criteria, I have systematically examined the behaviour of most of the known reflexes as also of the psychic functions under the influence of scopolamin-morphin and have obtained the following results:

Whilst the mucous membrane reflexes experience no alteration worth mentioning, the skin, tendon, periosteal reflexes are markedly increased at a fairly early stage, but I have been able only to a very slight degree to discover a regularity which could be employed for my purpose.

According to Link's investigations, which in part were carried out on patients in childbirth in our institution, the Babinski phenomenon is a sign of the beginning of the action of scopolamin which appears very early. The

shortest time in which it appeared was in a few minutes after the injection of .0012 scopol. hydrobrom.; the smallest dose after which it was observed consisted of .0004 scopol. hydrobrom., the simultaneously injected morphin being without effect in this respect. As patients react to scopolamin-morphin in extremely different ways, it would be all the same important to be able to ascertain by means of Babinski's reflex that the initial effect of scopolamin consisting of the functional cutting out of action of the cortex of the cerebrum was already taking place.

The pupillary reflexes take place in a perfectly normal manner with the exception of the dilatation due to pain.

The sensibility is not affected to any considerable extent; co-ordination, on the contrary, displays a more marked influence, and in conclusion, as regards the psychical aspect, the intelligence only suffers an apparent diminution due to the drowsiness. Whilst the memory works well, the increasing clouding of the consciousness is accompanied by an ever-increasing reduction of the capacity of observation. Of all these observations only the testing of the reaction of the pupils to pain, of locomotor co-ordination, and of the capacity for observation appeared to me to be likely to be of practical use. I shall therefore devote particular attention to that.

The dilatation of the pupils in response to bodily pain takes place, as I was able regularly to ascertain, also in response to a birth-pain, and is greater the more acutely the patient is conscious of the sensation of pain. It is consequently justifiable to draw the converse conclusion that the stronger the narcotic effect the less will be the dilatation due to pain in the course of a birth-pang; and in

fact this is so in a great number of cases. But in others the effect is absent, as it frequently is in the case of patients whose pupils have been greatly dilated in consequence of the preponderation of the action of the scopolamin.

The absence of this reflex cannot therefore up to the present be regarded as an absolute indication of the extent to which the consciousness has lapsed.

A second and in my opinion not unimportant criterion is the negative results of co-ordination tests, and especially of locomotor co-ordination test.

Of the various ways of testing locomotor co-ordination, I generally use the one which consists in asking the patient to put the tips of her forefingers quickly together whilst keeping her eyes closed.

The influence of a scopolamin-morphin injection on the co-ordination of muscular action is exerted promptly. As the Dämmerschlaf gradually begins, the locomotor co-ordination becomes worse and worse, and when the narcotic action has reached its highest point it is almost entirely absent.

It is easily intelligible that the observation of this indication is not an ideal criterion of the depth of the narcosis, either. In order to introduce as little of the narcotic into the body as possible, the Dämmerschlaf should be as light as it can possibly be without ceasing to be fully efficacious. But it is exactly for this debatable ground between sleep and waking that to judge the amount of clouding of the consciousness from the extent of the accompanying locomotor ataxia is by no means easy and the test often am-

biguous. I needed consequently some other absolutely certain test.

After trying all kinds of things, I believe I have discovered a test such as I need, one that if certain rules are observed never fails.

I was put upon the right track by the following considerations derived from views current amongst alienists:

The stage of scopolamin-morphin action that we wish to reach is a kind of condition of clouded consciousness—that is, a derangement of the consciousness. What we term consciousness is the sum of the simultaneous mental processes into which internal and external stimuli are transformed. Derangements of the consciousness are consequently pathological deviations from the regular course of these mental processes, which can exhibit various degrees of clearness according to the magnitude of the liminal value. A clouding of the consciousness in which the clearness of consciousness falls below a certain standard, we term "Dämmerzustand" (a condition of clouded consciousness).

Owing to the fact that the associative bridges between the consciousness during the term of this condition which we have just defined, and that of the waking condition, are for the most part broken down, there is a more or less well-marked defectiveness of memory for events occurring during the befogged condition; the same kind of defect which we also observe in the amnesia occurring after scopolamin-morphin injection.

Amnesia in general is a derangement of the memory which may take either of two completely different forms.

For we distinguish between weakness of memory which

consists in a diminution or loss of the capacity for remembering past impressions and the derangement of perception which is characterised by limitation of the formation of new memory pictures and images. In the amnesia produced by scopolamin-morphin the retention of already formed memory pictures and concepts is not affected but only the formation of new ones.

It must consequently be also conversely possible by testing the capacity of perception to arrive at conclusions as to the subsequently appearing amnesia and so as to the intensity of the action of the scopolamin-morphin at the moment.

My at first not very sanguine expectations were, however, confirmed by the favourable results of the experiments. The so-called scopolamin visit always paid to the patients after they had fully returned to consciousness in order to ascertain the final effect led regularly to the result that amnesia also set in as soon as the derangement in apperception began.

Since that time I have guided myself as to dosing almost altogether according to the variations of the carefully tested capacity of apperception, and have, when these tests have been properly carried out, never been misled as to the state of matters at the moment.

In the rare cases in which the carrying out of this presented difficulties on account of the dementia of the patient, or for other reasons, I observed the reaction to pain of the pupils, and the locomotor ataxia and utilised them as very welcome and valuable auxiliaries.

The value of these auxiliaries is further increased by a

certain regularity which a systematic observation of their order in time would seem to show.

The power of apperception is the most delicate indicator for the beginning of the action of the drug. Then come in order of sensitiveness the locomotor co-ordination and the pupillary reaction. The maximum action was consequently reached when the pupillary reaction ceased, whilst the Dämmerschlaf condition had already begun and was closely related in time with the cessation of the powers of apperception.

It is clear that accurate checking of the intensity of the action of scopolamin-morphin will not always be so very easy. Curiously enough, it is most difficult in the case of extremely demented and of highly intelligent persons. But an effective maintenance of artificial Dämmerschlaf is impossible without both a continuous and skilled testing of the condition as to consciousness at the moment. In cases, therefore, where it is impracticable for the medical man or—as is now done in the Freiburg clinic—for a skilful and well-trained, experienced obstetric nurse to keep a close observation on the whole course of the birth, nothing but repeated failures are to be looked for in the general results.

I myself had enough and to spare of such failures until I had learned carefully to eliminate every factor which was interfering with the action of the injections.

The first necessity in my opinion is that the patient should as far as possible be shielded from all powerful stimulation, whether mental or physical. It is consequently best to have the patient in a room by herself, where nothing disturbs the quiet beyond the proceedings

necessary for the birth. Loud conversation, penetrating noises, the coming and going of relatives—in short, everything that sets the patient's senses to work is carefully avoided.

How greatly just these stimulations which act upon the sense organs can interfere is shown by the observation we have often made that patients have apperceived nothing of the birth except the crying of the newly born infant, and that it is from this alone that they infer that the birth has taken place. We have therefore made it a custom to convey the child as soon as possible out of hearing of the mother, and, if necessary, to smother its cries still sooner by laying a cloth over it. More recently we have reduced stimulation of the sense of hearing with considerable success by the use of antiphones, or balls of cotton wool dipped in oil and put into the ears.

The sudden turning on of the electric arc lamps in our obstetric operating room has often just as great a disturbing effect. The sudden stimulation of the eye impresses itself only too easily on a patient lying in Dämmerschlaf as a persistent memory, and is often the cause of inopportune awakening. Protection of the eyes from such stimulation or, if necessary, a reduction of it by dark-coloured cloth or coloured spectacles (snow goggles) facilitates the maintenance of an uninterrupted artificial Dämmerschlaf.

The muscular sensation and the sense of balance have often made permanent impressions which as regards time lay in the sphere of the Dämmerschlaf. The feeling of being lifted, of the transportation, has often remained as an isolated recollection. Several women can also remem-

ber a feeling that they had "suddenly become so empty," or that something had suddenly come out of them. They do not generally arrive at the conclusion that this sensation was due to the birth of the child or of the placenta until afterwards, if at all. At the time when we made extensive use of the application of the hanging position, a series of patients could clearly remember that they had lain in a position in which the head had been downward and in which they had the feeling all the time of slipping down an inclined plane.

The organs of touch and of perception of pain showed themselves, as indeed lay in the nature of the case, least sensitive to stimulus. Bodily pain was with relative difficulty apperceived by women in Dämmerschlaf, it making no difference whether it was caused by pin pricks, pressure on the abdomen, birth-pangs, or other indignities. The first of the pains due to the birth-pangs to disappear from the consciousness are the feelings due to the contractions of the uterus, whilst those due to compression and dilatation of the soft parts are perceived for some time afterwards. We have utilised the smallness of the reaction of the consciousness to stimulation of the sensitiveness to pain of the skin by employing the Dämmerschlaf as a preparation for Bier's lumbal anæsthesia which has been lately so much used for obstetric operations. The lumbal puncture, which is otherwise very painful, and on this account is retained in the memory, is deprived of its unpleasantness by the blunting of sensation and the beginnings of amnesia. Penkert * has recorded the favourable experiences obtained on this point in gynæcological cases in the Frei-

* München med. Wochenshrift, 1906. No. 14.

burg clinic; those obtained in the obstetrical department will be published by me on another occasion.

The torture of the sensations of suffocation when inhaling chloroform or ether vapour loses its terrors if Dämmerschlaf with its consequent amnesia is employed.

The fact consequently already known to us from alienists' practice that for every species of sensation a certain limiting stimulus exists, is here confirmed. The surroundings must be such that this limit is not overstepped, and if any stimulations powerful enough to arouse sensation (crying of the child, glaring light) cannot be avoided such stimulations must by suitable means be so reduced in strength as to remain "below the perception limit."

In addition to the observation of these hints, a close and uninterrupted watching of the case is an unavoidable necessity for the proper production and maintenance of artificial Dämmerschlaf. It alone, for example, renders possible a correct, that is to say, a sufficient and yet uninjurious dosage. If this is not done the result is either overdosing, in which case the unpleasant concomitant effects mentioned above make their appearance, or the Dämmerschlaf is not uninterrupted, so that the patients retain in their memories events and observations made during isolated lucid intervals in the course of a more or less protracted period of amnesia. The existence of such "memory islands"—as I term them—is, however, extremely injurious to the total effect. The patients connect them with one another by natural trains of thought, and so form for themselves a picture of the birth that precisely because it is based upon isolated exact observations, gives them so much the more the idea of having a genuine

recollection of the course of the birth. Ziehen speaks in his *Textbook of Psychiatry* of this partial amnesia as "additive memory," an expression which, being very characteristic, I should like to use for an imperfectly maintained Dämmerschlaf. It is often very difficult to convince patients with such an additive memory how large a part of the whole course of the birth they had passed in sleep.

If I have up to now shown that an almost ideal method of reducing pain is put at our disposal by an exact dosing of the scopolamin-morphin Dämmerschlaf, that is nevertheless far from saying that this favourable result may not be greatly decreased in value by unfavourable concomitant effects.

The concomitant effects affect subjectively the patient's feelings, and objectively the whole course of the physiological processes during and after birth in the case of both mother and child.

Let us first discuss the subjective feelings of the patient during and after birth.

Amongst the subjective effects one subjective unpleasant result of the injections should be mentioned: namely, thirst, which has already been briefly spoken of as a symptom of the initial action of scopolamin-morphin.

It is well known that scopolamin has the property of considerably reducing the secretions of the mucous membranes so that it is indeed in various cases used for this particular purpose. The result is, of course, a feeling of thirst varying in strength in different persons. This is exhibited objectively in a dry tongue and dry lips.

I have never hesitated to counteract a concomitant so unpleasant to the patient by giving as much liquid as was

desired, and in spite of this have never seen any injurious results follow from the increased consumption of liquids.

In particular, vomiting was hardly ever observed unless it had already appeared before the injections. This applies both to the birth and the period of lying-in. There has likewise never been complaint of headache, diarrhœa or constipation, and rarely of giddiness.

Derangements of the senses of sight and hearing have now and then been observed. The patients answer questions which nobody has put, and sometimes carry on in this way whole conversations; that portion proceeding from the patient and audible to the observer shows that it is a rational reply to aural hallucinations of the patient, consisting of words and sentences.

The sense of sight appears occasionally to have its share in these delusions of the senses, the patient stating that she sees persons and objects black.

I have already mentioned above that mental hallucinations—aptly termed "delusions of the imagination" by Kraepelin—occasionally occur.

As all these hallucinations occur only in stages of unintentionally profound derangement of the consciousness, it is clear that the patient can afterwards remember none of them, so that they do not come into account as affecting the subjective comfort of the patient.

More imporant both in general and in particular than any unpleasant concomitant effects on the subjective condition of the patient which might occur, were the objective effects which influenced the physiological course of the birth and lying-in period.

The points which were of importance in this respect

were taken into serious consideration and thoroughly examined.

The most important factor for a normal course of the birth itself is the satisfactory working of the ejecting forces—that is, of the birth-pangs and the straining action. How do they behave under scopolamin-morphin injection?

To clear up this question beyond dispute, it was necessary to undertake a detailed observation of the birth-pangs.

As subjective impressions of the frequency and power of the pangs cannot be considered as objectively utilisable for purposes of proof, the more exact checking of the pangs was undertaken by recording and registering them in curves. This indeed made extraordinary demands on the time and energy of the observing staff. But, on the other hand, the curves give the clearest possible view of the pang action, both as regards itself and as regards its dependence on the action of the scopolamin-morphin.

These pang curves were described in the following way as shown in the sketch (blackboard). The ordinate of the figure representing a pang indicates the interval of time between that pang and the previous one. The abscissa show how long it itself lasted. So the higher the "pang mountains" are the less was the frequency of the pangs. The broader the "mountains" are the more powerful the action of the individual pain, and conversely. It will be admitted that even at the first glance a very good general idea of the pang action and the influence on it of the injections can be obtained from these curves. And this idea has so much the greater title to be considered scientifically exact as each separate pang of each indi-

vidual birth was recorded as regards time of occurrence and duration. The curves were subsequently made still more correct by the elimination of a source of error that at first was not detected. Since it has become known that as the action of the injections increases the exhibitions of pain on the part of the patients confine themselves also more and more to the climax of the pang, and even in given circumstances cease altogether, when the injections are producing their full effects, the pangs have been no longer recorded, from the signs of suffering given by the patient, but in accordance with the contractions observed by the hand of an obstetric nurse kept continuously on the uterus.

Such curves were plotted altogether for a hundred and thirty-one births. If it is very possible by merely glancing through them to gain an impression of the action of scopolamin-morphin on the pangs, one is much more entitled to pronounce an objective judgment as to the frequency and number of the pangs and in particular as to their dependence if any upon the injections after carefully going into the curves. I considered this point as so extraordinarily important in its bearing on the question of the use of scopolamin-morphin in obstetrics that it has been taken up for treatment by Schlimpert in the form of a dissertation.

The statements which follow rest upon Schlimpert's laborious work (128 pang-curves) and the critical notes entered by me in the diary at the end of every birth. The figures derived from the results calculated from the 128 curves will be found in Schlimpert's paper mentioned

above. I myself am in possession of notes of the pang action in 493 births.

The pangs were recorded as excellent in 103 cases, as good in 273 cases, as bad from the very beginning in 39, and as varying in 36. In these 451 births no notable affection of the pang action by the injections was to be detected.

In 42 cases, on the contrary, an alteration in the pang action was clearly observed. In 8 cases they were after the injection worse than before, and in 36 cases it was noted that they were decidedly better after than before the injection. How far the alteration of the pang action in these 42 cases was due to the drug, and in how far to chance would be very difficult to ascertain.

But leaving this out of account, it is clear from the figures that there can be practically no question of an unfavourable action of the scopolamin-morphin injections on the pangs.

The observation often made by bystanders that a diminution in the power of the pangs is clearly to be seen after the injections is sufficiently explained by the diminution or cessation of subjective demonstrations of pain on the part of the patient, it being universally the custom to judge the extent of the pang action from them. If these sceptics are told to test the power of the pangs by placing the hand on the uterus, they see reason to change their opinion: it can be easily perceived that the processes of birth are continually unchanged although there are no outward signs of intense suffering.

An increase of the intervals between the pangs which, according to Schlimpert's calculation, occasionally occurs,

might be considered as an objection to the use of scopolamin-morphin if he had not also frequently observed an increase in the duration of the pangs and also a clearly recognisable regulative effect of previously irregular pang action after the injections. According to my observations, a temporary diminution in the frequency of the pangs was especially likely to occur if the initial dose had been too great.

It could be proved in all the eight cases in which a deterioration of the pangs took place after the injections, that large doses of morphin, such as in the newer system of dosing which has proved preferable do not occur at all, were to be held responsible.

The second most important factor for the course taken by the birth is the straining action. It also deserves to be observed with a special care in following a birth.

To meet the objection which might be made that I had observed the straining pangs of patients having a first child through the same spectacles as the pangs of the other patients, I have, in what follows, added in parentheses the number of the former cases to the figures showing the total number of births.

In what follows, records of the intensity and nature of the straining pangs were made in 460 of my 500 births. The straining action started spontaneously in 444 cases, and could be described in 160 (68) as excellent, in 267 (93) as good, and in 38 (31) as bad.

In the remaining 16 births, the straining action was only applied on request, and was in 1 (0) case excellent, in 13 (3) good, and in 8 (4) bad.

It will be seen from this résumé that in 3.5 per cent. of

the cases spontaneous straining action did not occur, and that in 1.7 per cent. a satisfactory action was not to be obtained even on demand.

It cannot be denied that this would be a disadvantage of the Dämmerschlaf if it were a result of the injections; if this result appeared to be unavoidable and if a prolongation of the birth followed from it.

It is very rarely that in midwifery practice a birth treated without narcotics comes spontaneously to its conclusion by the action of the uterine contractions alone, without any appreciable assistance from the straining action; from this it may be concluded that the deterioration or absence of reflex straining action in my cases is a result of the scopolamin-morphin injection.

On the strength of the experience gathered on the subject of artificial Dämmerschlaf, I have indeed come to the conclusion that the above-mentioned unfavourable effects upon the straining action are in so far results of the Dämmerschlaf that they occur when, by an erroneous system of dosage, large quantities of narcotic are administered to the organism in a single dose. Morphin has proved to be in this respect particularly dangerous; its property of suppressing the pangs and straining pangs even when administered in relatively small quantities, has been indeed for long well known enough. This is far less true of scopolamin; which, as a matter of fact, only exerts an unfavourable influence upon pangs and straining action if administered in very large quantities at a time.

Schlimpert has also observed the same relation between the extent of the clouding of the consciousness on the one hand and the straining action on the other.

He found that in 20 cases of ordinary Dämmerschlaf the reflex straining not only was not abolished, but in most cases was even good or excellent. In 131 cases, in which there was an advanced degree of stupor, 22 cases were noted in which the straining pangs were more or less bad, and in part only occurred on demand. Apart from the fact that of 131 births a certain number even without scopolamin would exhibit a defective straining action, ten of these cases were either simply complicated or part doubly complicated by narrow pelvis, premature or early bursting of the membrane, deep transverse position of the child, or large child, so that other explanations could be offered besides that of the effect of scopolamin-morphin.

I have drawn two lessons from the observations of the relations existing between pangs, straining action, and Dämmerschlaf.

In the first place, too large quantities of scopolamin-morphin must not be given at one time. One begins, consequently with the relatively small doses mentioned above, and gradually adding to them induces the action, so to speak, surreptitiously. Larger quantities administered in a limited time bring about indeed a more rapid effect, but also often—not always—involve a danger of undesirable concomitant effects upon the pang action.

Second, the quantity of morphin introduced into the body must be kept as small as the desired narcotic effect permits. The higher doses of morphin which I at first used to give have, in addition to the comatose condition of the patients described above, also on their consciences the drawbacks noted during the observation of the pang action. As it is possible without injuring the Dämmer-

schlaf to keep as low as .1-.15 morphin for the whole course of the birth, it lies entirely in one's own power by following the directions for dosing which have been found most suitable to avoid any unfavourable influencing of the forces performing the task of birth.

A consideration of the frequency of operations shows how little the penalty paid for this knowledge influenced my statistical result. Of 506 children, 49 were delivered with the forceps, 9 by rotation and extraction (2 of them after vaginal cæsarean section), 1 by classical cæsarean section, and 4 by subcutaneous hebotomy. (The forceps being also used in 1 case.)

This amounts to an operational frequency of 12.60 per cent, which is about the same as the operational frequency calculated by Ploeger as being 12.78 per cent. of the gynæcological wards of the University of Berlin, which I quote here for purposes of comparison.

Of the 63 women delivered operatively, 37 were having their first child, and 26 a second or subsequent one, so that of the former 16.2 per cent. (Ploeger, 11.19 per cent.) of the births were ended operatively and of the latter, 9.7 per cent. (Ploeger, 13.07 per cent.)

These are figures from which no protraction of the duration of birth due to the use of artificial Dämmerschlaf can be deduced which can in any way influence the question of its applicability.

Comparative statistics of the duration of birth must also give important information as to the effect of the injections on the forces of ejection. I am indebted for the following figures also to Schlimpert's paper, mentioned above.

The duration of birth was recorded in 128 cases. The average for

First Births	18	hrs.	23	min.
Subsequent Births	13	"	58	"
Both Classes	16	"	11	"

It should be remarked that only two-thirds of the cases were uncomplicated head presentations.

The following figures have been given for the average duration of first and other births taken together:

Spiegelberg	17	hrs.	..	min.
Lumpe, (1,045 births)	16	"	30	"
Veit, 9,731 head presentations, in and out patients	14	"	36	"
Bumm, uncomplicated head pres.	12	"	30	"
Simpson	10	"	38	"
Lachapelle for Boys	9	"	34	"
Lachapelle for Girls	6	"	36	"
Berlinsky	19	"	..	"

The following averages have been given for the duration of birth for first births alone:

Spiegelberg	20	hrs.	..	min.
In and Out Patients	19	"	30	"
Veit—				
In Patients alone	20	"	..	"
Massen	16	"	18	"
Wolf	18	"	27	"
Bumm	15	"	..	"
Suamensky	17	"	54	"
Parischen	17	"	39	"
For subsequent births alone:				
In and Out Patients	11	"	50	"

Veit—				
In Patients only	15	hrs.	8	min.
For Second Births	8	"	35	"
Massen—				
For Subsequent Births	8	"	6	"
For Second Births	11	"	10	"
Wolf—				
For Subsequent Births	10	"	42	"
Suamensky	12	"	1	"
Parischen	11	"	25	"
Bumm	10	"	..	"

Taking into account that Veit's and Bumm's figures refer only to uncomplicated head presentations, and if we leave out of account the extreme values given by Lachapelle and Berlinsky, it may be said that the duration of the Dämmerschlaf births does not vary from that of the others.

Schlimpert has also collected figures regarding the duration of the ejection period alone. He chose 93 cases in which the records of the birth, in addition to exact statements of the times, also contained the note, "Patient in deep stupor." He selected these, in order, by using precisely such births occurring under an extremely deep action of scopolamin-morphin, to avoid the objection that the results might have turned out so favourable by chance or by defective analysis of the cases. He ascertained that the average duration (for all births) was:

For First Births	3	hrs.	27	min.
For Others	1	hr.	47	"

Against these may be set the following figures given for ejection (for uncomplicated head presentation only):

For First Births, by Veit, 1 hr. 45 min; by Bumm, 1 hr. 30 min.
For Other Births, by Veit, 1 hr. 0 min; by Bumm, 0 hr. 45 min.

Von Winckel opposes some higher figures to these most strikingly low ones. He found for first births, 1½ to 7½ hours. For other births, ¼ to 1½ hours.

A comparison with the figures given by Veit and Bumm shows a difference in the ejection period to the disadvantage of the scopolamin-morphin births. As, however, the average for the duration of the whole birth nearly agrees for all three, we are almost driven to the supposition as an explanation for the differences existing in the ejection period that a different stage was regarded as the beginning of the ejection period. The indications regarded by many authorities as marking this beginning—complete distention of the *muttermund,* the first *presswehe,* or the bursting of the membrane—occur at times that may differ fairly widely.

To objections which may possibly not be laid by this attempted explanation of the difference in the duration of the ejection period, I would reply with the following considerations:

First, the difference in time is so small as to be practically of no account.

Second, I consider the general advantages of artificial Dämmerschlaf to be far too great to be in any way outweighed by the disadvantage, if it is in fact present at all, of such a minute retardation of the birth.

Third, the figures were intentionally derived from cases in which the consciousness was especially profoundly affected.

As, however, the artificial Dämmerschlaf ought to keep, if carried out properly, as nearly as possible to the lower limit of the region of Dämmerschlaf, the figures given above would be too unfavourable for births with the less profound action on the consciousness which we aim at. In addition, we must remember that large doses of morphin must be held responsible for any deterioration in the muscular action of the birth that may occur. As I, however—also for the sake of the child—have long been using doses with a much reduced quantity of morphin, the data calculated by Schlimpert would be much improved upon by figures based upon the present and different dosing.

In addition to this extremely deep affection of the consciousness, there is also a second factor which prevents us from placing Veit, Bumm, and Schlimpert's figures on absolutely the same footing—the circumstance, namely, that Veit and Bumm included only uncomplicated head presentations in their statistics, while Schlimpert's figures included all the complications that occurred—and they did so in a third of the total number of cases.

And, finally, even if a prolonged action on the birth appeared in more cases than it has yet been observed to, that would still be no reason for casting discredit on the use of artificial Dämmerschlaf. For since we require a new injection every two to four hours, about, to preserve an uninterrupted effect, we have it entirely in our power to avoid any retarding action of scopolamin-morphin which may really exist.

If we see that a patient responds to scopolamin-morphin by a weakening or cessation of the straining action, we let

her wake up and without the scopolamin-morphin add her voluntary labour to the involuntary contraction.

In such a case, nothing is lost and much is won, inasmuch as we have spared the patient completely the sufferings of the initial period.

The intensity of the pangs in the placenta period generally runs parallel to that in the initial and ejection periods.

We are consequently entitled to assume that if no appreciable diminution of the pang action in consequence of artificial Dämmerschlaf has occurred during the birth, effects of this kind will not make themselves apparent in the after-birth period either.

The résumé compiled as to the course of the placenta period in my five hundred births confirms this conclusion:

The placenta was ejected spontaneously (with or without the voluntary straining action) 280 times (56 per cent.); in 251 of these cases without hæmorrhage, and in 29 cases with slight hæmorrhage which ceased on employment of massage of the uterus and did not amount to over 500 grms.

In 215 cases (43 per cent.) it was ejected on pressure or Credé; in 145 cases without hæmorrhage; in 50 cases with slight and in 20 with severe hæmorrhage.

In 3 cases (6 per cent.) finally manual detachment of the placenta was necessary. There were two additional cases which I have not included in calculating the percentages under this heading. The operation in them—one a classical and the other a vaginal cæsarean—was simply an invariable portion of the course of these operations. On account of what has been said as to the unfavourable influ-

ence exerted by scopolamin-morphin on the placenta period, I will shortly describe in more detail the circumstances in which a manual detachment had to be carried out in the three cases mentioned above.

One was a woman who had already undergone eight manual detachments: that is, in every one of her previous accouchements. Detachment was indicated by the appearance of fever six hours after the birth of twins. In the second case, operation was resorted to nine hours after birth because in spite of all efforts the placenta was retained in the uterus. In the third case it was necessary on account of hæmorrhage after a premature birth.

In the 495 cases of a non-operative birth of the placenta (99 per cent.) there were consequently 20 cases (4 per cent.) of somewhat severe hæmorrhage: *i.e.*, with a loss of over 500 grms. of blood. Hæmorrhage was once the indication for manual detachment. Digital examination of the uterus after the ejection of the placenta was in addition carried out in four cases, since it was impossible to be absolutely certain that the greatly disintegrated placenta was complete. In no case was a torn-off cotyledon found.

That digital examination was resorted to in the absence of hæmorrhage simply on account of difficulty in judging of the completeness of the placenta was due to consideration of the fact that the danger of intra-uterine manipulation with a negative result immediately after the birth is to be considered as immeasurably less than that of one during the lying-in in cases in which a retention of the cotyledon which had up to then given rise to no symptoms

suddenly occasions the much more serious complications of severe anæmia or puerperal infection.

Comparative statistics of manual detachment of the placenta give results very favourable for my five hundred births.

The following table, in which the frequency per cent. of manual detachment is given by the most various authorities, shows this clearly *:

Clarke	0.3%	M'Clintock u. Hardy	0.9%
Ahlfeld	0.3%	Stadfeld (by Ahlf. Meth.)	1.0%
Felsenreich	0.4%	Dammann (by Credé)	1.2%
von Both-Ahlfeld	0.6%	Lindfors	1.4%
Stadfeld (by Credé's method)	0.6%	Eras	1.6%
		Fischer (by Credé's meth.)	1.6%
Gauss (this paper)	0.6%	Zeuschner	1.7%
Leopold	0.8%	Galca	2.0%
Stadfeld (by Dubl. meth.)	0.8%	Fischer (by Ahlfeld's meth.)	3.2%
Dammann (by Ahlfeld method)	0.8%	Baumgartner	3.4%
		Maygrier	7.3%

The non-operative ejection of the placenta took place as to time

In under ½ hour	205 cases	Under 2 hrs.	52 cases
" " 1 "	132 "	" 3 "	31 "
" " 1½ hrs.	58 "	" 6 "	16 "

That is to say, in 447 cases under 2 hours, and 63 cases from 2 to 6 hours.

The comparison of figures as to the method of ejection gives also results very favourable to my 500 births.

The placenta was born spontaneously or by conscious

* Winckel's Handbuch, 1. Band, 2. Hälfte.—Ahlfeld, Zeitschrift für Ged. u. Gyn., Bd. 57, Heft. 1.

effort, in Ahlfeld's 406 births, in 23 per cent.; in my 500 births, in 56 per cent. By pressure or Credé in Ahlfeld's births, in 77 per cent.; in my births, in 43 per cent.

Derangements of the placenta period, being one of the fears most often expressed with regard to the use of scopolamin-morphin Dämmerschlaf, this comparison was of especial interest and value to me.

In general, my figures are completely normal, especially when it is remembered that the custom of expelling the placenta by pressure after half an hour or more on principle, does not exist in the Freiburg clinic. Under all circumstances—hæmorrhage of course excepted—the spontaneous detachment of the placenta is awaited, and the expulsion, if up to that time it has not already taken place spontaneously, is left to the straining action of the patient or facilitated by gentle pressure on the abdomen, not on the uterus. Use is not made of more violent methods, such as vigorous Credé or manual detachment, until the placenta has delayed its appearance for more than 4 to 8 hours.

And, finally, an effect of the scopolamin-morphin injection also on the puerperal functions of the body is not inconceivable. It has already been mentioned that scopolamin-morphin affects the glands and mucous membranes, drying them and diminishing the secretions. In consequence, it is hardly superfluous to discuss the question how women delivered in scopolamin-morphin seminarcosis behave with regard to milk secretion during the puerperal period.

With this object I have taken the trouble to place beside 200 scopolamin-morphin births another 200 with-

out scopolamin-morphin which took place during the same period for comparison.

It turns out that the following percentages were able to suckle their children:

Without scopolamin-morphin		With scopolamin-morphin	
137	68.5%	134	67% completely
8	4%	15	7.5% partially
55	27.5%	51	25.5% not at all

It can be seen from this that the scopolamin-morphin injections exert no injurious influence on the milk secretion.

I was not able to study the process of involution of the genital organs and ascertain whether this was in any way affected by the use of scopolamin-morphin; the patients being for lack of space generally, if circumstances permit, discharged on the seventh day; but no noticeable evil effects on the involution and in particular no hæmorrhage during the lying-in attracted my attention.

To avoid detrimental effects on the organism of a more general nature which might be attributed to the use of scopolamin-morphin, I have made further investigations of another kind.

The accurate investigations of Benno Müller of Hamburg have attracted more general attention to the effects of various types of narcosis on the parenchymatous organs, especially the kidneys. This suggested the carrying out of similar investigations for scopolamin-morphin Dämmerschlaf.

I have tried to do this both clinically and by experiments on animals.

Keeping in mind the fact that injuries to the parenchyma of the organs, if present, could best be detected in the urinary secretions, I examined the catheterised urine of 50 patients, 44 of whom were confined in scopolamin-morphin Dämmerschlaf and 6 in scopolamin Dämmerschlaf. Specimens were taken before the injections began to take effect and 24 hours after the birth had taken place.

Three of the scopolamin-morphin patients showed albumen at the first examination; at the second it was no longer present. In two cases urine which had been free from albumen at the first investigation was found to contain it at the second. The remaining 45 patients had no albumen either during the birth or whilst lying-in.

Now it is well known that the mean frequency of albuminuria during parturition is, according to Flaischlen, 16.9 per cent., and according to von Winckel, 19.4 per cent.; the latter author stating that in from one-fourth to one-third of the cases in question it could be shown that the albuminuria was purely a continuation of that existing during pregnancy.

There is consequently so much the less reason to assume that the two cases of albuminuria during lying-in observed by me were anything but transitory occurrences.

I have in addition made experiments on rats, guinea pigs, and rabbits, thus pursuing the same object by pathological anatomic methods. By means of injections I brought the animals into a state of intoxication and then killed some of them in this condition and others after it had passed off, examining the freshly extracted organs by the methods used by Benno Müller.

I was also anxious to ascertain at the same time whether

possibly a difference between the effects of scopolamin-morphin, scopolamin alone, and morphin alone on the parenchymatous organs of the kidneys could be detected by pathologico-anatomical means.

As these investigations became very extensive and as the parallel between Dämmerschlaf in human beings and the narcotic action in animals can only be used within limits as a proof of the innocuousness of the scopolamin-morphin Dämmerschlaf, I have relinquished the idea of discussing the question in this paper. For the results of these experiments on animals I refer to a paper to be published elsewhere.

There is still another objection which I think I ought to refute in advance. It is well known that surgeons accuse ether narcoses of predisposing to thrombosis of the crural veins; although up to the present no sufficient explanation of this allegation has been given, yet the possibility of such a connection between a narcotic and the blood vessels cannot be denied offhand.

Thrombosis of the veins of the thigh being of special importance for the period of lying-in, it must be of equal interest to ascertain whether scopolamin-morphin also has any connection with thrombosis.

Of the cases of this kind observed during three years in the Freiburg clinic, seven were of crural thrombosis and two of embolism. Four of the patients were confined without scopolamin-morphin, the remaining five were delivered in Dämmerschlaf.

What at first sight appears to be a strikingly higher percentage of scopolamin-morphin Dämmerschlaf cases takes a different aspect when one adds that one of the

women had already had a thrombo-phlebitis during pregnancy, and that three of the others developed it after undergoing hebotomy, of which thrombosis unfortunately still forms one of the most undesirable complications.

No other complications during lying-in were observed, which could be attributed to the action of the narcotic; and no exitus lethalus can be laid at its door either.

On the other hand, a special point is deserving of more attention. Of the three cases of convulsions which occurred among the women confined in Dämmerschlaf, two were cases of puerperal convulsion; the third patient, after having had two attacks before the Dämmerschlaf, had only one more, which was followed by no others.

The treatment of convulsions by means of narcosis has fallen indeed more and more into disuse; but nevertheless it is impossible to deny that the narcotic reduces the sensitiveness of an eclamptic patient towards stimuli. Although I by no means wish to contend that the late appearance of the attacks and final recovery in the case of our patients was due to the effect of the scopolamin-morphin, the cases are yet so much the more noteworthy in that these three cases with the exception of one other (no scopolamin-morphin) are the only ones which, in spite of otherwise absolutely identical treatment, did not terminate fatally of the seven cases of eclampsia observed in the course of one and a half years. This feature is indeed very rare in Baden, but when it does occur appears to be all the more severe. It would no doubt be well worth while to test by the investigation of a larger number of cases whether scopolamin-morphin Dämmerschlaf in addition to

causing earlier delivery is capable of playing a material part in the cure of eclampsia.

It will be clearly seen from the foregoing that as far as the mother is concerned there can be no question of injurious incidental effects of the Dämmerschlaf. It remains to be seen whether the child is equally fortunate.

As the possibility of the vital functions of the newborn child being influenced by the narcotic cannot be dismissed *à priori*, I did not in my first cases make use of the injections unless I were already in a position to end the birth at once at any moment; that is, in general, never till towards the end of the initial stage. As no injurious effects of the injections on the child before delivery could be detected by the most careful observation, I soon considerably increased the duration of the Dämmerschlaf.

The experience obtained from the births hitherto observed has absolutely convinced me of the innocuousness of Dämmerschlaf in regard to the children. This confidence is best shown by the rule now invariably followed of beginning the injections as soon as the pangs occur at regular intervals and are found unpleasantly painful by the patient, without any regard for the stage which the birth may have reached or the complications that may be present.

And now as to the child itself:

Of the 506 children, including six cases of twins, 500 (98.8 per cent.) were born alive, and 6 (1.2 per cent.) were still-born.

Of the 500 children born alive, 316 (63.2 per cent.) of all born alive were born vigorous and lusty; that is to say, did not vary in their behaviour from the normal. Four of

them were born prematurely, and died after a short time.

One hundred and nineteen (23.8 per cent.) of those born alive showed, on the other hand, a condition that led us to conclude that the injections had affected the child's organism. This condition of intoxication presents somewhat of the following appearance:

The newly born infant takes one deep breath at the moment of birth with a more or less loud cry, and then lies sometimes motionless and sometimes moving its limbs, the heart's action continuing.

It is only now and then that a short breath is taken, so that between them the appearance of recurring cyanosis is presented in consequence of the accumulation of carbonic acid gas and the lack of oxygen in the body. At the same time it opens its eyelids but then immediately allows them to close again slowly, as if tired. The diameter of the pupil is meanwhile so extremely various that no inference can be drawn as to the intensity of the narcotic action. In the majority of cases the diameter was equal to or greater than the average.

The following symptoms are also especially characteristic of this intoxication-like condition. The children respond vigorously to stimuli, but the reflex muscular action so occasioned is often quite suddenly interrupted before it is complete, as if the carrying out of the intended movement had been all at once forgotten. The action of the heart meanwhile is clearly dependent on the nature of the breathing. As the interval from the last breath increases, the fœtal pulse slows down gradually to about 60 beats, rising immediately again to the normal frequency as soon as the next breath is taken. This process is continu-

ally repeated at continually diminishing intervals until the breathing either spontaneously or in consequence of external causes becomes regular. From the moment at which regular breathing begins, the children no longer show any deviation from the normal.

In my earlier cases this condition inspired me with great uneasiness, and I consequently considered myself bound to immediately commence measures for resuscitation.

Gradually, however, by cautiously delaying my intervention, in suitable cases, I found that this anxiety was exaggerated, so that at various times for the sake of experiment I calmly waited to see whether the child would begin to breathe properly without any outside intervention. Various infants treated in this way for over fifteen to twenty minutes established regular breathing without assistance, the breathing action becoming more and more frequent, and finally absolutely regular. If the question is asked whether children born in this condition of intoxication would get over their apnœa or oligopnœa even without medical assistance, we can answer yes with that degree of probability which we in medicine have a right to expect.

In spite of this, I have hitherto considered it my duty not to leave the house so long as a patient was still under the influence of scopolamin-morphin, and until we have the experience of a considerably larger number of cases than I yet have at my disposal I shall also consider it my duty in future to always be in attendance, ready to render assistance if necessary. If, in the case of one section of children born oligopnœic, I delayed taking action, at all

events for a time, yet in the case of the others I began immediately with efforts for resuscitation.

It was found that slight tickling of the skin was, as a rule, sufficient to produce regular deep breathing and loud crying.

The quickest and surest method was always a rhythmic massage of the heart, probably principally because this method combines tickling with a direct influence on the heart and respiration.

Asphyxia, which is the most serious breathing difficulty at birth, does not occur as a result of scopolamin-morphin, and the percentage of these rare cases, due to various causes, is the same as it was before the introduction of Dämmerschlaf.

I have arrived at the following explanation of this very peculiar condition:

The child is born with a quantity of the narcotic received through the placentary respiration.

The first gasp takes place at the moment of birth, probably on account of the joint action of various factors, such as sudden variation of pressure, cooling of the skin, mechanical irritation of the skin, in conjunction with the stimulation of the centre of respiration through lack of oxygen and accumulation of carbonic acid.

If the child remains now tranquil the chemical irritation of the centre of respiration only produces in the future continuous breathing.

In the case of babies born during the mother's Dämmerschlaf, however, the stimulation of the centre of respiration is not physiologically strong enough; it is perhaps weakened by the effect of the narcotic and requires

first a greater overcharge of the blood with carbonic acid, and a more pronounced lack of oxygen, eventually even renewed tickling to start and maintain regular breathing.

The favourable and prompt effect of resuscitation I may compare to the similar effect of a flywheel: once set in motion, it is kept in motion permanently by small, regularly active forces which would not have been sufficient to start it.

The main point is, therefore, to get the oligopnœic children through the difficulty of the sluggish reaction of the centre of respiration by means of external stimulation in order to attain a prompt regulation of the life functions. Although I do not believe that this intoxicated condition harbours any serious dangers to the organism, I have, nevertheless, taken occasion to avoid it experimentally by modifying the dosage.

On the strength of my observations, I thought that the intoxicating effect was caused in the first line by the dose of morphin, and I tried, therefore, to lessen same or even avoid it altogether whilst maintaining or eventually increasing the dose of scopolamin.

These experiments of dosage, their influence upon the muscular action in labour, as well as upon the consciousness, having already been commented upon, had the interesting result, with regard to the child, that a curtailment of the dose of morphin permitted me to avoid the unwillingly taken risk of causing oligopnœa or apnœa respectively without rendering uncertain the establishing of the Dämmerschlaf. If the quantity of scopolamin was increased beyond a certain limit, eventually even omitting morphin entirely, slight intoxicating effects were observed in the

child which were the more pronounced the dimmer the state of consciousness of the mother. If the first injections were heavily overdosed, the intoxicating effect upon the child took place sooner than in its mother; whilst the latter still retained unclouded consciousness, the former was eventually born in a state of apnœa. Morphin by itself causes deep apnœa in the child at birth if any progress of the delivery took place at all.

In the same manner as the condition of the newborn child may be taken as the best indication as to the correctness of the dosage applied, it is possible, according to my experience, to inversely infer the condition of the child to be expected at birth from the degree of dimness of the consciousness.

If by careful observation of the distinctive signs an overdosing of the mother and an overloading with morphin unnecessary for the production of Dämmerschlaf is avoided, incidental effects in the newborn child can always be avoided.

The first impression of my results seems to contradict this statement; the consideration of several facts, however, easily explains this apparent contradiction.

As I applied the first dosages without knowledge of the effect to be expected of the scopolamin-morphin in general, overdosage was unavoidable.

Only gradually I then learned the objectionable effect of the quantities of morphin that are superfluous in producing Dämmerschlaf, which effect increased the statistics by a number of oligopnœic children.

Finally, after realising the relative harmlessness of overdosing, I aimed directly at ascertaining experimen-

tally which doses of scopolamin and morphin were sufficient to induce artificial Dämmerschlaf in the mother and child within a short time and without secondary effects.

If we divest the statistics about the primary condition of the child of these failures resulting from intentional and unintentional experiments, and base them on the dosage found by me to be suitable, then the results for the children are as favourable as I have already pointed out.

Of 50 children, the mothers of whom had received as a first dose .0006 scopolamin and .01 morphin, and after that only repeated injections of .00015-.0003 scopolamin without morphin, only 5 (10 per cent.) showed oligopnœa. In these five instances I had to achieve the desired effect within from 2 to 6 hours, for which purpose four times .0012, once even .0015, scopolamin was necessary; the consequence of these high dosages of scopolamin, that were too strong for the space of time under consideration, was oligopnœa of the child. In the remaining 45 cases in which there was sufficient time to produce the Dämmerschlaf more slowly, the secondary effects on the child did not appear in consequence of the dosage being calculated correctly.

The advisability of the slowly acting dosage containing little morphin holds therefore good also with regard to the initial state of the newborn child.

Sixty-five of the children born alive (13 per cent.) were asphyctical. Forty-seven times the asphyxia could easily be explained without having to assume an effect of scopolamin-morphin. Twenty-two times a long duration of the process of the birth with normal, 11 times with narrow pelvis, 7 times fever of the mother, and 6 times tight

twining round of the umbilical cord were noted; twice prolapsus of the umbilical cord, 4 times a difficult operative extraction of the child, once eclampsia of the mother, were observed; 3 times a fluctuation of the child's cardiac sounds were ascertained even before the first injection.

Eighteen times, finally, no sufficient explanation of the asphyxia could be found. Nevertheless, it would not do to connect the asphyxia in these instances with the effect of scopolamin-morphin. In part of the cases the mother was not yet in the Dämmerschlaf at the time the child was born; moreover, in all the children born asphyctically the symptoms of intoxication, which are characteristic of oligopnœa, were lacking; and finally it is not absolutely always possible to explain every asphyxia of the child.

Five of the children born asphyctically could not be permanently restored to life, in spite of intensive and extensive efforts to that end. These cases require a more detailed explanation.

One child was so seriously asphyctical that it did not recover any regular respiratory and cardiac function at all. I entered the room in this case after the midwife had kept back the big head of the child nearly one hour in order to prevent the tearing of the vagina; as I observed meconium, I became suspicious. I found a quite irregular, much slackened heart beat, and allowed, therefore, the head to come out, after which I found the child to be in the above-mentioned condition, from which it did not recover.

In two instances the child had aspired quantities of mucus when it was born spontaneously—before the forceps could be used on account of fluctuating cardiac

sounds; although it was possible to save them with strenuous efforts to restore life, especially in one case by an infusion of the vein of the umbilical cord with sodium chloride according to Schücking, both succumbed later on to pneumonia.

The fourth child was born with the aid of forceps on account of the long duration of the birth caused by narrowness of the pelvis after the head had entered the pelvis. It was deeply asphyctical, but, though recovering after a subcutaneous infusion of fructosat of natrium, it died the following day with the symptoms of cerebral injury. The postmortem examination showed a large hæmatoma covering the entire top of the skull.

A fifth child showed slight cerebral symptoms in consequence of the use of forceps necessitated by slow expulsion, which symptoms seemed to be disappearing; about 5 hours later the re-appearing symptoms led to the death of the child, the postmortem examination showing merely an abnormal thinness of the skull. The question of the possibility of intoxication was answered in the negative by the examinator.

Besides the above three children that died as a result of an injury received at birth, five children died off during birth.

One was already dead when the mother was received.

One died in utero, because an enforced birth was desisted from on account of placenta prævia, shortly after the indirect turn on the foot had been accomplished.

One died—after a very long duration of the birth with narrow pelvis—in consequence of the infant's cardiac

sound being badly controlled when its head had already deeply entered the pelvis.

One was brought dead into the world in consequence of technical difficulties in a turning and extraction rendered necessary by a prolapsus of the umbilical cord.

One, finally, was lost as it was born unobservedly in a transverse position and then remained with the head in the vagina, manifoldly wound with the cord.

This last case needs a thorough explanation.

I was busy with the preparation and completion of a manual placentary solution while this transverse position took place in a bed close by, watched, though badly, by a midwife student.

As the mother was in the scopolamin-morphin Dämmerschlaf, she did not notice the unexpectedly rapid birth; I personally made this very disagreeable discovery when lifting the blanket, that the child that had certainly still lived before the beginning of the disinfection of my hands, lay dead and half born between the thighs of the mother.

This accident can be ascribed to the scopolamin-morphin Dämmerschlaf in so far only as the mother in labour could not notice the birth herself.

This very circumstance illustrates drastically that when using the Dämmerschlaf a permanent supervision and constant readiness to give assistance is an essential condition; if this condition is complied with, no such accidents can happen.

Now, somebody might object that the effect of scopolamin-morphin in the child might only assert itself in childbed or at a later time.

Against this objection the following may be said:

In the course of the first two weeks postpartum, 18 children (5.94 per cent.) that had survived the first three days postpartum, died: 5 from infection of the navel and intestines, 10 from debility through premature birth, and 3 in consequence of malformation.

It cannot very well be asserted that these statistics demonstrate a prejudicial effect upon the child by scopolamin-morphin within the first weeks of its life.

But in order to be able to still more thoroughly remove eventual doubts, I have tabulated my results in comparison with results obtained with children born here from 1895 till 1904, as far as their weight exceeded 2,500 grms. at birth.

It will be seen that

Among the latter	Among mine	
5.8 per cent.	1.0 per cent.	were still-born, of which
1.5 per cent.	0.2 per cent.	were dead previously, and
4.3 per cent.	0.8 per cent.	died under observation.
4.0 per cent.	2.6 per cent.	in the first 9 days postpartum.
0.3 per cent.	1.0 per cent.	died from injuries received at birth.
3.5 per cent.	1.6 per cent.	from other causes.

About the objection that unfavourable consequences of the Dämmerschlaf may occur later on, there remains to be said a few words.

Vague suppositions are of no weight; in order to make possible a conclusive, scientific criticism, a large number of investigations is necessary with regard to the later fate of the children, which would only be possible many years afterwards.

If we may form a general opinion from the later con-

dition of health of the children of private patients which can easily be kept track of, we may say from the observations made till now that within the first year there can be no talk about an injury to the children in their general and especial development on account of the employment of the artificial Dämmerschlaf.

In order to carry out a large series of investigations, a sufficiently large number of births in the Dämmerschlaf is necessary; to which investigations our klinik has taken pains to contribute.

Scientific experiments on such a basis and with such results are justified; seeing that the question is still open, everybody may have his own opinion about it; but he will not, at length, be able to resist the demonstrative force of exact investigations.

A few words remain to be said about counter-indications of the scopolamin-morphin Dämmerschlaf.

First of all, I regard primary pains as a counter-indication. On the one hand, these feeble first pains are not worth the trouble of making an injection; and, on the other, relatively large doses of scopolamin-morphin would be necessary to maintain the Dämmerschlaf over a long time and the quantity would be out of proportion to the object aimed at.

Furthermore, I avoid the Dämmerschlaf in cases where the observation of the consciousness enables me to make important conclusions *à posteriori* as to the general state of health, such as debility, fever, anæmia, in which instances the action of the scopolamin-morphin would blur the clinical aspect and render it therefore considerably more difficult to plan a definite course of treatment. Pa-

tients with somnolent conditions (for instance, when suspected of typhus, perityphlitis, peritonitis) and such conditions in which eventual interruption of the consciousness (acute anæmia in placenta prævia) may be expected, would not have to be excluded from the use of Dämmerschlaf. I do not consider it necessary to desist from the use of scopolamin-morphin injections as an aggravation; besides, the loss of consciousness will be apparent from sufficient other significant symptoms. I do not even think it desirable to desist, in the case of eclampsia, for in such cases the injections have a beneficially soothing and pain-blunting effect.

Besides these cases which might be thought of as counter-indications, I do not deem it necessary to consider any others.

I herewith condense the result of my work as follows:

The Dämmerschlaf produced by scopolamin-morphin is able to limit the suffering of the woman in labour to the lowest minimum imaginable.

This object is attained:

Without disagreeable secondary effects upon the subjective condition of the mother in labour.

Without substantial interference with the labour itself.

Without danger to the mother.

Without injury to the child.

The scopolamin-morphin Dämmerschlaf renders possible a truly humane execution of the didactic duties of the institutes of learning without tormenting interference with the women in labour.

The scopolamin-morphin Dämmerschlaf during birth, therefore, is a method till now unparalleled, and proves to be a blessing to the doctor and the patient, to the clinical instructor and the disciple.

APPENDIX III

FURTHER EXPERIMENTS IN DÄMMERSCHLAF

By Dr. Carl J. Gauss

Karlsruhe Address, Conference of German Naturalists and Doctors

1911

I

There are now 8,000 cases of the use of scopolamin-morphin in obstetrics, 3,000 of them in the Frauenklinik at Freiburg. In the six years of the Dämmerschlaf at Freiburg there has been no change in the technique, so that the 3,000 furnish homogeneous statistical material as a touchstone on which to test other groups.

Danger to the mother never occurs if deep narcosis is avoided. On this point most authors are just as clear as we are at Freiburg. The deaths for which the method has been held responsible cannot be laid to its charge. Under our method the mortality of mothers shows no increase.

There is likewise no danger to the child if Freiburg directions are observed. All authors who report dead children have deviated from the Freiburg rules. The occasionally observed oligopnœa of the newborn children is

a symptom which every child brought to birth with the forceps also exhibits, without anybody attaching any importance to it. Cases of asphyxia do not occur more frequently than in ordinary practice. As Hoche expresses it, *sequelæ* in later life should be referred to the realm of fiction. Retardation of the birth and increase of the frequency of operation need only be expected if, by a wrong technique, an actual narcosis is produced.

The avoidance of unpleasant accessory effects and the obtaining of the proper and safe Dämmerschlaf are entirely dependent on the strict observance of the rules given for the method. Imperfect understanding of these rules has often and in various ways led to bad results. A conscientious following of them, on the other hand, guarantees the obtaining of Dämmerschlaf in the vast majority of cases; that is, up to 82 per cent. On the basis of the experience of six years, with 3,000 births under scopolamin in our own clinic, it still can be maintained that the Dämmerschlaf is to be looked upon as devoid of danger, and a great blessing.

Since in 1864-67 ether was introduced for narcosis by Jackson and Morton, and chloroform by Simpson, there has been a never-ending controversy as to which of the two drugs is the better. Those who advocated either the one or the other were nevertheless agreed upon one point: that was that in both methods death and undesirable accessory effects occurred which could not always be avoided. This fact was the basis of all those endeavours which aimed at replacing narcosis by chloroform and ether, by new drugs and new methods.

The honour has been done me of entrusting me with the

task of speaking to you of one of these substitutes, namely, of that method which seeks by the injection of scopolamin and morphin to reduce the dangers of general narcosis.

I think I ought to give you a general idea of the pharmacological side of the subject: namely, (1) in what forms the scopolamin-morphin is given; (2) what are the advantages and disadvantages of the various methods of administration; (3) what are we, with our present clinical experience, entitled to look on as definitely the advantages for ourselves and our patients?

The specific action of scopolamin-morphin as a narcotic was first recognised and tested by Schneiderlin and Korff in Freiburg in 1900. They started from the idea that a combination of the two alkaloids must be a particularly happy one, as their anæsthetic and hypnotic effects are common to them, while their remaining properties are almost without exception antagonistic. It was consequently to be expected that a summation of the desired narcotic action would be accompanied by the simultaneous diminution of their dangers.

As a matter of fact, recent laboratory researches have made it appear probable that in scopolamin-morphin we have not, as was formerly believed, two independent substances acting in conjunction, but a new combination that acts in a completely different way from its individual components.

In addition to the improvement of the narcotic action by this combination, a number of additional advantages are to be observed, which may be briefly mentioned. These are: reduction of salivation, diminution of nausea, and the abolition of the subjective unpleasantness which ac-

companies the initial stages of every inhalation narcosis—that is, feelings of terror and suffocation.

No doubt there are also disadvantages in the physiological effect to be set against these advantages: increased frequency of the pulse; distention of the blood vessels in the head region; insufficient relaxation in spite of large doses; an ill effect on the respiration; very great thirst, and variability in the action.

On account of these disadvantages, substitutes for both components were sought. Instead of morphin, pantopan was used. But the experimenters did not succeed in materially reducing the bad effects upon the respiration which had been due to the morphin. In this respect narkophen gave better results, but was in so far inferior that the narcotic action occurred later and the analgesia appeared to be greater than the clouding of the consciousness. The clinical experience with narkophen is without doubt, so much can be said already, in all respects favourable. Like morphin, it appears to involve no danger if reasonable care is exercised in the dosing.

Attempts have also been made recently to evade the unaccountability or instability of chemical composition of scopolamin by the use of atropin. But the action of atropin is by no means as satisfactory as that of scopolamin.

On the other hand, to judge from my own clinical observations, it is quite possible that this seeming unaccountability of the drug is only the expression of individual and extraordinary sensitiveness in various patients, or even in the same patient at different times and under different circumstances. Both the careful adaptation of the dose to the individual (old people, for instance, can stand much

less) and an increase of the keeping qualities of the drug by the addition of chemicals remove this objection completely.

What, then, have the clinical results to tell us? The number of cases of pure scopolamin-morphin narcosis is great enough to enable us to form an opinion of the method. The ever-recurring observation is that small doses were not sufficient for major operations, which require complete relaxation of the muscles. But if the dose was increased, and this was done up to .0036 scop. + .045 morph., unfavourable accessory action on respiration and circulation was observed, which sometimes even caused death.

Judging from all observations made, there can be no doubt that for major operations the use of scopolamin-morphin alone cannot be recommended without danger.

The case of minor operations is quite a different one. In them much smaller doses suffice, which involve no danger to the patient. To these belong all those which require only a reduction of pain with greater or less clouding of the consciousness; methods of examination which are subjectively disagreeable to the patient, such as cystoscopy or rectoscopy, and numerous therapeutic operations, such as curettage. In this respect our technique has been greatly improved, especially in consequence of the experience which we obtained in obstetrics.

Since Steinbüchel's first attempts to make scopolamin-morphin of use in obstetrics between 8,000 and 10,000 births have been observed in which this combination was employed. The results appear to be extremely contradic-

tory: on the one hand, warm advocacy; on the other, brusque rejection of its use for births.

Closer examination gives a very simple explanation of these contradictions; for different methods, with technique differing in principle, must naturally lead to quite different results: Steinbüchel, Hocheisen, and Dämmerschlaf are three distinctively different methods.

Steinbüchel used one rather small dose of scopolamin-morphin, repeating the same dose when necessary. Hocheisen used one dose generally large, sometimes very large. In some cases he did not repeat; in others he repeated the full dose *as soon as signs of painlessness appeared,* though painlessness is a sure sign of overdosing. Dämmerschlaf uses one initial dose, small or of medium size. It seldom repeats the morphin—at most once, in half a dose. Further doses of scopolamin are a third the size of the first dose, and they are given *only when signs of memory appear.* This insures the minimum dose for attaining practical painlessness; this constant limitation to the minimum dose insures against overdosing, with its possible bad effects on mother, child, and birth process.

These facts are not only important to the obstetrician; they have also a practical interest for the surgeon and gynæcologist. The doses given in a unit of time to obtain the Dämmerschlaf used in obstetrics are also used in operations in which it is necessary to resort to supplementary inhalation narcosis on account of the failure of the relatively too small scopolamin dose. That is to say, we have here a new application of the scopolamin-morphin action, a preparatory action.

All these authors unanimously remarked that in addi-

tion to the advantages of a preliminary narcosis, one fact was most striking: namely, a reduction in the amount of inhalation narcotic used.

In the Freiburg Frauenklinik exact investigations have been made concerning the extent to which we economise the use of chloroform-ether, by using scopolamin-morphin. These showed in a group of 192 major gynæcological operations in which the Roth-Drægers chloroform-ether-oxygen apparatus as adapted by Krönig was used, that in the case of 90 women without scopolamin-morphin .29 cc. chlor. + 2.22 cc. ether; 102 women with scopolamin-morphin .14 cc. chlor. + 1.69 cc. ether per minute were necessary to maintain sufficiently deep narcosis. This reduction in the inhalation narcotics must simultaneously cause a reduction in the risks: that is, if the principle of mixed narcosis is correct. According to the latest laboratory investigation, it may be said that this principle is no longer in doubt; more especially as clinical experience confirms these results. Indeed, this has been carried still further. Not only scopolamin has been used as a preliminary drug, a whole series of other drugs were used in addition, in order, as much as possible, to reduce the dangers of each by means of the others. A narcosis in many clinics, including Freiburg, is constituted, for example, as follows:

Veronal 1.5
Veronal .5
Sc.- M. 2 or 3 doses
.0006-.00075; 1.5-2 cgr.
Main Narcosis.

With regard to the virgin narcosis, whether ether, chloroform, or A. E. C., opinions differ greatly; but it is cer-

tain that for all, the preparatory action of the scopolamin-morphin is equally favourable.

To sum up, scopolamin-morphin is used:

(1) For main narcosis—a dangerous use.

(2) As preliminary narcotic before inhalation narcosis.

(3) For minor operations, examinations, etc.

(4) As preliminary narcotic before local, stovaine, etc., spinal or lumbar anæsthesia, the injection of morphin without scopolamin is itself a principal operation.

For some of these uses also scopolamin without morphin is sometimes used.

(5) As obstetrical seminarcotic for producing condition of clouded consciousness.

II

Dämmerschlaf in obstetrics has one property in common with other methods: namely, that it was enthusiastically welcomed by some and opposed and rejected with equal energy by others. After the pros and cons in theory and practice had waged an indecisive struggle for seven years, the question has now reached a new stage. We have now in possession statistics of a sufficiently large number of births—over eight thousand, of which there were three thousand in the Freiburg Frauenklinik.

As no material alterations have been made in the directions laid down by me for the technique of Twilight Sleep six years ago, these 3,000 Freiburg births constitute

very homogeneous statistical data to serve as a touchstone for the value of the methods used elsewhere. So do not expect me on this occasion to describe the advantages of the Twilight Sleep. Our patients can describe them much better than we. I only desire to prove here that it is the Twilight Sleep that has itself refuted the bad reputation given it in some quarters.

I will begin with the most important point in the hostile criticism: namely, the alleged danger to the mother. It makes one's hair stand on end when one reads that child-bearing patients in Twilight Sleep have a respiration reduced by as much as four breaths in the minute, a pulse increased to 150 beats, and a temperature rising to as much as 39 degrees. This can only be a confusion with gynæcological surgical narcosis which does not hesitate to administer as much as .0036 in three hours. Even then there must be in addition a further confusion with lumbar anæsthesia with which alone subsequent rises of temperature have been observed. To this category belong the mortality of 3.3 per thousand (0/00) mentioned by Strassny, and the oft-quoted Toth case (Tauffer), in which .0003 — Wertheim — hæmorrhage—and relaparotomy— (Death).

To this category belong his statements about the danger of death later on, from heart collapse and suffocation.

Obstetrical literature records only one death laid to the charge of scopolamin: namely, the one recorded by Bardeleben. The formula for this is .0003—spontaneous birth—hæmorrhage—death after 9 hours—postmortem, anæmia and weak heart.

In accordance with the majority of authors who regard

scopolamin as devoid of danger for the mother, the injection cannot be regarded as the cause of the mother's death one single time in all our cases. Our maternal mortality of .0033 is ten deaths, among which there was one with placenta prævia, one with colporrhexis with funnel-shaped pelvis—both these from hæmorrhages. Eight died of puerperal fever. The septic cases (with .2 per cent. puerperal mortality) are due to two separately occurring house endemics. Those from angina each took place during courses of instruction for midwives.

The morbidity in the various years ranged from 1.7 per cent. to 10 per cent., and amounted on an average to 7 per cent. That is certainly not a worse figure than is shown in other clinics.

The point second in importance—the occurrence of danger to the child—occupies a much larger space in the literature of the subject. The Twilight Sleep is said to be responsible by direct poisoning for seven dead children. If we investigate these cases more closely, we find among them: One diaphragmal hernia (Gminder); one necrosis of the roof of the skull (Avarffy), due to pressure; one double pneumonia (Avarffy); one lues (Hocheisen); and one Thymus death (Meyer); the cause of death was in each case ascertained by postmortem. Of the seven, therefore, there remain only two, one of which died after application of the forceps (Hocheisen) whilst the other (Bass) died with symptoms suspiciously like those of morphin poisoning.

Our own statistics show a child mortality of 1.3 per cent., not including premature births, monstrous births, and children already dead. We have not lost a single

to walk late, and one-ninth of them to speak late. Hanner tested these results which had been arrived at on the ground of anamnestic data on 450 children of the Breslau out-patient department. He found that difficult birth with asphyxia of the child did not dispose to abnormal mental development or idiocy, more than normal birth. It is interesting to note that through the fault of the midwife Goethe was born with asphyxia, according to Mobius.

If it is, then, to be considered as highly probable that the application of scopolamin, even in the form of overdosing, may be taken to be devoid of direct danger, whether to mother or child, it may easily be supposed that it may cause injurious effects indirectly, in the matter of birth-pains, straining action, and post-natal hæmorrhage.

It is beyond all doubt that *these deleterious effects may appear* if too great doses are given. Since an influence on the motor force of the uterus would make itself most clearly apparent in the frequency with which the use of the forceps or placental operations became necessary, I will bestow some little attention on this point. The literature mentions that the frequency with which the forceps was used amounts to 20 per cent., and could easily be raised to 100 per cent. if one used it wherever indicated.

The frequency of forceps cases in Freiburg has settled down to an average of 6 per cent. to 7 per cent. As the subjects of all forceps applications made for demonstration are sent into Dämmerschlaf for this particular purpose, this is a figure that need not fear the light of day.

The frequence of manual placenta detachment ranges between .2 per cent. and .6 per cent., and has an average

of .4 per cent. This is a smaller figure than is to be found in most statistics.

To come to the principal object itself, the anæsthetising and narcotising action of scopolamin-morphin, after this preliminary consideration of the adventitious effects, I should like to direct your attention to the fact that the expression "failure" used in the literature is as a matter of fact not at all appropriate.

The second method of using scopolamin-morphin is essentially *not* Dämmerschlaf, but a reduction of the sufferings during birth; and this, in spite of Mansfeld's opinion, is, as a matter of fact, accomplished in every case. Twilight Sleep is accomplished successfully when there is an adequate abolition of the apperception of pain. It is to be looked upon as a kind of subconsciousness, in which the cortex of the cerebrum is, according to the investigations of Finck, completely cut off from the reflex columns of the spinal cord.

Strassny's custom of waiving aside the explanation of this peculiar and hitherto unknown state of consciousness, with the unmannerly remark that it is a doctoring of the facts to speak of painless birth, is inconsistent with the dignity of scientific investigation. Whatever Strassny may say, the Twilight Sleep still appears to us and to our patients as a condition well worth the trouble of attaining, and pleasant to experience.

With regard to the effect, I have now to state that we obtain Dämmerschlaf in from 63 per cent. to 65 per cent. of births; a marked reduction of suffering in 22 per cent., and no effect in from 13 per cent. to 15 per cent. The absence of effect may have been occasioned by too long de-

ferred injection, or by refractoriness to anæsthesia on the part of the patient. To this it is due that in the first class we had 82 per cent. Dämmerschlaf; in the second, 66 per cent.; in the third, 59 per cent., and in the fourth, 56 per cent.

How comes it, then, that such a great difference exists between results in Freiburg Klinik and those of other authorities?

It does not lie in any lack of sober-minded observation, as Herr Bumm thought fit to say five years ago. A considerable factor in the explanation is supplied by the prejudice with which various obstetricians, on their own admission, entered on their investigation.

Steffen, for example, of the Dresden clinic, says in his paper that he knows of no more pleasing sight than that of a strongly built woman giving birth to a first child with strong and painful birth-pangs.

Avarffy, as quoted by Barsorsy, acknowledges openly that he had recourse to the Dämmerschlaf only under compulsion. Hocheisen regrets that he is compelled by the demand of the public to employ a poison that is so terrible and so unreliable, and—as it seems to me not without a certain malicious pleasure—he records all the injurious effects on a card which shows in a hundred births 134 interferences with the normal course of birth! The best method would break down with such a point of view as these represent as the basis of an investigation of its value. This is especially true of the Dämmerschlaf, which more than any other requires to be employed with sympathy and an open-minded desire to make the most of it. It is consequently no wonder if the reports of the authors just men-

tioned do not precisely constitute a hymn of praise to the Dämmerschlaf.

Second in importance, external circumstances ranked as obstacles to success. The lack of sufficient obstetrical staff is the first obstacle; for, as Mansfeld says, we can form no idea of what enormous care, trouble, and continuous watching a well-conducted Twilight Sleep demands. Fehling mentions the fact that not every young doctor displays capacity for carrying out the method.

I learned also from private sources that in other clinics the passive resistance of the midwives has led to the relinquishing of the method. Finally, the correct technique has often not been employed, and this, unfortunately, in very many clinics. In addition, we may assume that not every assistant in all clinics who is getting experience in the delivery room is given the careful instructions about the Dämmerschlaf that we are accustomed to give, especially in the memory tests. This is by itself sufficient to make the proper action of the Dämmerschlaf problematical. As early as 1907 I wrote an emphatic warning: "The special action and the safety of the Dämmerschlaf are based solely upon the testing of the powers of memory, and by this method we must stand or fall." With regard to this passage, Mansfeld expresses himself as follows: "It is really extraordinary that publications written in perfectly clear German can be so misinterpreted." Hocheisen, Messer, and many others have, however, come forward as opponents of the Dämmerschlaf without paying any attention to this, the very foundation of the method, and this is just what cannot be done with impunity.

The Twilight Sleep is a narcotic condition of extremely

limited breadth, like a narrow mountain crest. To the left of it lie the dangers of too deep action, with narcosis and absence of birth-pains; to the right, the danger of too shallow action, with retention of consciousness and sensibility of pain. The power of memory is and remains the only guide. If we cling to it, and to testing it in strict accordance with the rules laid down, then the Twilight Sleep is devoid of danger, as is shown by our statistics, and is a great boon, as is proved by the gratitude of our patients.

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